FACTORY

MANAGEMENT AND MAINTENANCE

SEPTEMBER 1958 A McGRAW-HILL PUBLICATION • PRICE ONE DOLLAR

NEW MAINTENANCE SURVEY... p. 90

Today's Maintenance Management Practices in 359 Plants

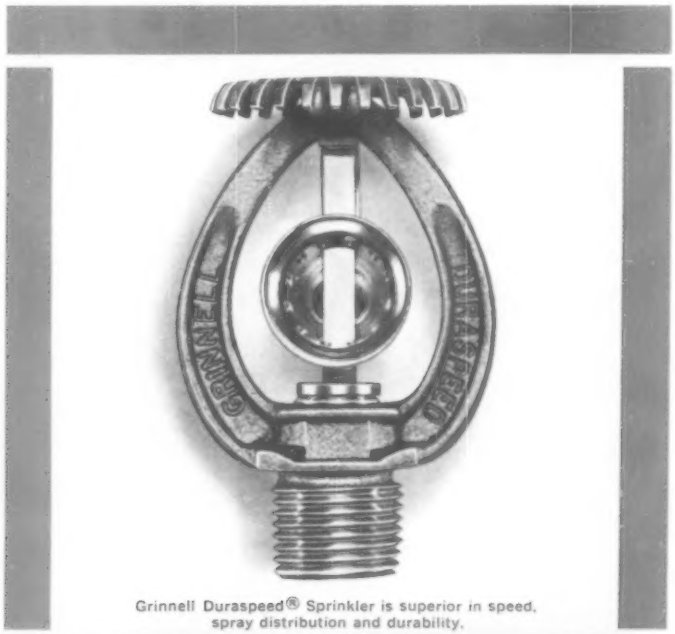
NEW WAY TO TIME MERIT RAISES ..... p. 108

NEW WORK SAMPLING TECHNIQUE ..... p. 178

THE MAGAZINE OF PLANT OPERATING MANAGEMENT

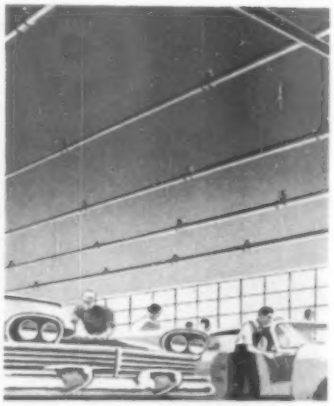
GRINNELL INSTALLS COMPLETE SPRINKLER SYSTEM WITHOUT DISTURBING AUTOMOTIVE ASSEMBLY LINE Grinnell Sprinkler Systems are completely engineered, whenever possible, for quick installation with a minimum of down time or disruption of normal routine. Grinnell shop-fabricates superior Grinnell-made parts — and delivers them on time to meet tight schedules. They are erected by skilled crews who specialize in sprinkler installations only. ☐ That's why there's a big difference in Grinnell Sprinkler installations. Big insurance savings, too . . . with reductions in premiums often 50 to 90%. For more facts, write Grinnell Company, Inc., Providence 1, Rhode Island.

GRINNELL



Grinnell Duraspeed® Sprinkler is superior in speed, spray distribution and durability.

8 A.M. SATURDAY



8 A.M. MONDAY

Within 48 Hours! . . . Saturday, 8 a.m., Grinnell "task force" arrived after assembly line shutdown for week-end. Entire prefabricated sprinkler system — sprinklers, fittings, pipe hangers, valves — was expertly installed without delay, error, or cutting corners.

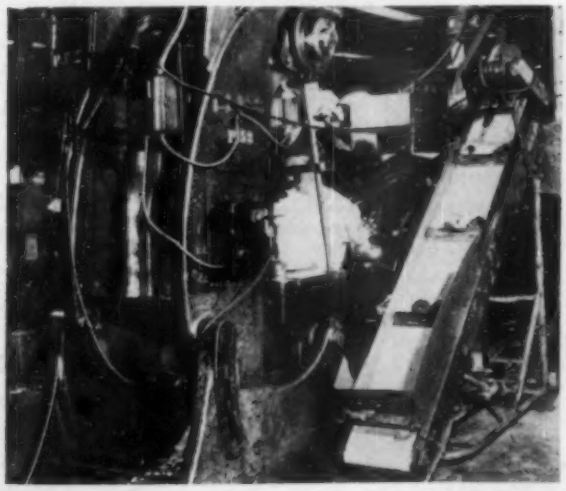
Without Production Loss! . . . Monday, 8 a.m., job is completed, assembly line rolling on schedule. Thanks to another Grinnell "beat-the-clock" installation, a big-three auto manufacturer got its automatic sprinkler system without losing a single hour of production!

For more facts circle 446 on READER SERVICE CARD

B.F.Goodrich

B.F.Goodrich distributors helped these companies cut costs

Stops sliding boxes. Boxes riding up that belt used to slip and slide, sometimes fell off. One crash ruined a $150 electrical fixture. The B.F.Goodrich distributor suggested a new belt called Griptite, specially designed to carry both light and heavy boxes. Now that the new belt is on the job, all sorts of packages—big and little, heavy and light—march up the incline with no slips or slides, no breakage.



Saves $3,500 in two years. That sand has just been shaken from red hot castings. It's scorching hot—so hot that it ruined conveyor belts in 3 months. Then a B.F.Goodrich distributor recommended a B.F.Goodrich Solarflex belt. It has already lasted 2 years—8 times longer than previous belts. Maintenance Supervisor estimates savings of $3,500 in belt replacement costs alone and expects belt to last 2 more years.

Takes roughest treatment. Bang! And two more sharp, oily steel parts are thrown on the belt by a punch press operator. Service was so rough that the woven cotton belt that came on the conveyor lasted only two weeks. Other belts wore out in three or four months. Then a B.F.Goodrich distributor suggested the B.F.Goodrich belt, made of Koroseal flexible material. The Koroseal belt has outlasted them all, still looks good as new.

B.F.Goodrich distributors are specialists in rubber, ready to put their training and experience to work for you. These examples show some of the different ways B.F.Goodrich distributors find to make rubber save money for users—either by doing a job other rubber can't do—or by lasting longer—or by replacing other, more expensive materials.

By making your B.F.Goodrich distributor your chief supplier for rubber products, you'll benefit by getting top quality, and you'll save buying time, have a dependable source of supply, and get fast delivery on most items from local stocks. *B.F.Goodrich Industrial Products Co., Dept. M-392, Akron 18, Ohio.*

B.F.Goodrich ***industrial products***

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MANAGEMENT AND MAINTENANCE

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THE MAGAZINE OF PLANT OPERATING MANAGEMENT

Edited exclusively for the men with management responsibility for production and maintenance in the manufacturing industries

PROBLEM-SOLVING GUIDE

THIS SIMPLE FILING SYSTEM is designed to give quick access to past FACTORY articles that can help you solve current operating problems. Here's how it works:

1. All major articles and many short items are classified according to a functional code system (below). Codes cover basic operating responsibilities.

2. Where applicable, articles are also coded (see numbers in parentheses) to show secondary or closely related topics.

3. To use, cut up the items below. Paste them on 3x5-in. cards and file by code number. To cross-index, copy the information on a second card, and file by secondary code.

Note: For suggestions on using this new tool (plus an outline for a more complete decimal filing system), see FACTORY, February 1957, page 104.

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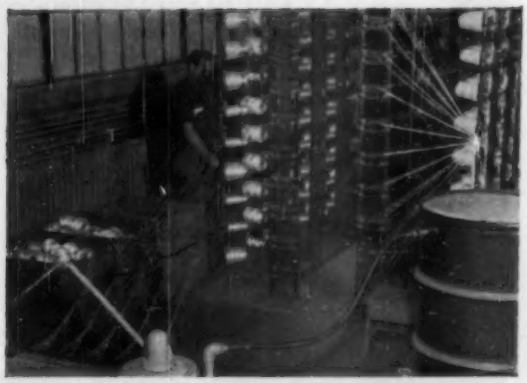

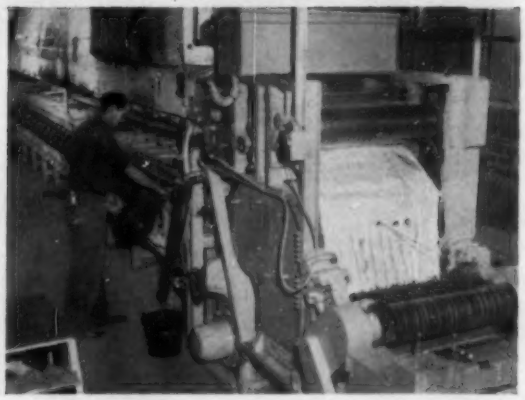

Moneysaving performance is built into every Goodyear V-Belt in exclusive manufacturing processes like those illustrated above. Synthetic fiber cords are impregnated repeatedly with special rubber latex compounds. When treated at a precise tension and temperature for a precise time (the exclusive 3-T process), the cords are stabilized at the point of greatest strength before being built into the load-carrying section of Goodyear V-Belts.

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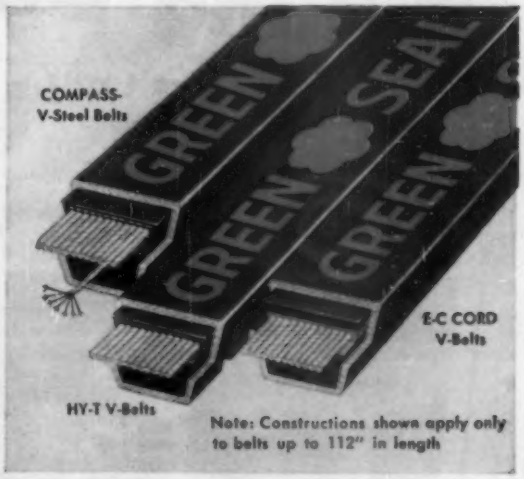

DIMENSIONALLY STABLE V-BELTS with the GREEN SEAL by

GOODYEAR 60

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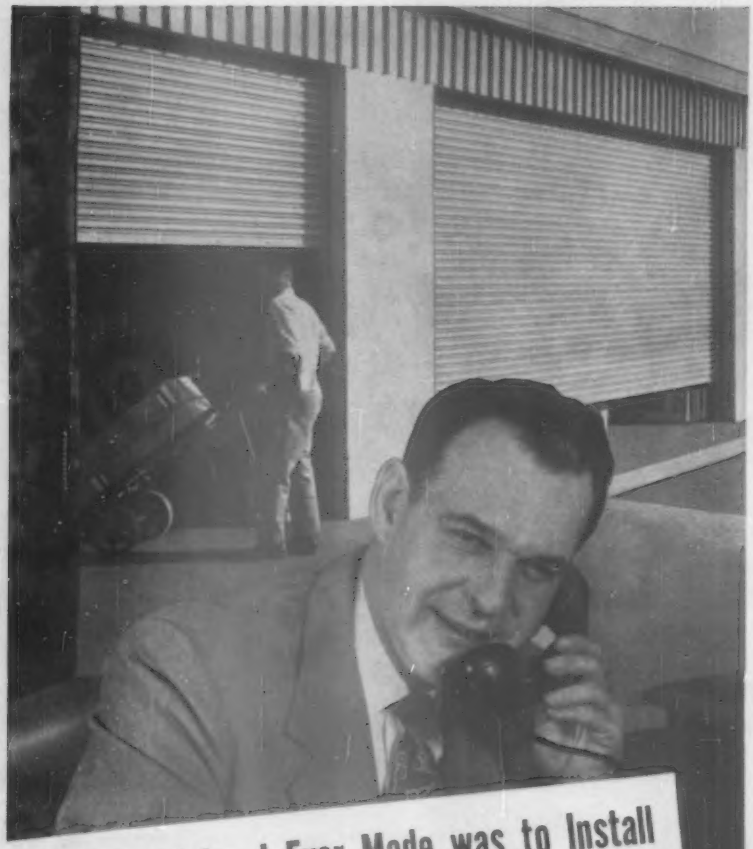
Compass, E-C Cord, Hy-T, Green Seal—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio



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FACTORY LETTERS

DOORLESS DOORS

(By telegram)

Appreciate by return Western Union information on manufacturers of invisible doors as described p. 94 June FACTORY.

Albert Horwitz
President
Hortes Manufacturing Co.
El Paso, Texas

► We know of three sources in the U. S.: American Air Curtain Corp., 10408 Manchester, St. Louis 22; New Castle Products, Inc. New Castle, Ind.; Sulzer Bros. Ltd., 50 Church St., New York 7.—ED.

OUR SWISS MISS

Sir:

We were disappointed in the article ("Now—Doors Go Invisible," June FACTORY, p. 94) with regard to the lack of mention of our company and only mention of our competitor. We feel that credit was not properly given, and a one-sided viewpoint may be obtained by your readers. We realize that the article was written with what you no doubt felt were the best facts . . .

American Air Curtain Corp. provided the first air curtain entrance in the U. S. in a Kroger supermarket, in November 1955. The Reno gambling house referred to in the article is an installation provided by this company at the Harrah's

Turn the page

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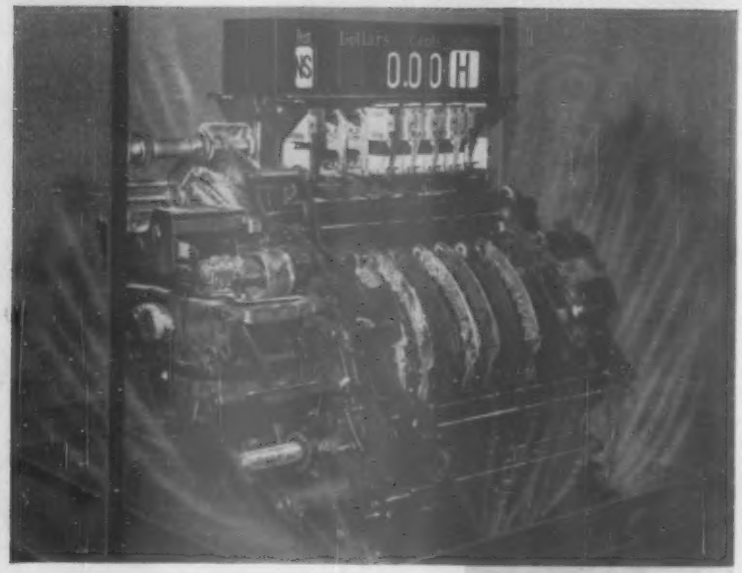

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FACTORY / LETTERS

Begins on page 6

Club, and is the widest entrance in operation in this country. It is unusual also in that it is never closed, nor is there any auxiliary means provided to do so.

We have a number of industrial units in operation, including the highest in the country, an 18 x 20-ft. entrance capable of handling railroad cars and large industrial trucks. Another entrance in a machine shop handles industrial trucks with half-a-dozen trailers.

Our licensee, "Sifrag," a Swiss corporation, made the first commercial installation in Europe in the Oscar Weber Department Store, in Zurich, Switzerland, in 1952.

Ernest Gygax
Vice President
American Air Curtain Corp.
St. Louis 22

► We are sorry you felt inadequate credit was given to your company. It was our impression from apparently reliable sources that basic patents are held by Sulzer of Switzerland; therefore, we avoided mention of names of any American vendors or engineers.

However, since publication we have received several inquiries as to where "invisible doors" can be purchased (see p. 6). In each case, we have listed your company, and will continue to do so.—ED.

NEW PLANTS WANTED

Sir:

Please place our name on the mailing list of those who will receive your questionnaire on new plants. We have two plants completed in 1958, which we would like to enter in your annual competition.

M. L. Kaganowich
Plant Engineer, Ozalid
Johnson City, N. Y.

► Anyone else have a new plant? Those completed and occupied any time during 1958 are eligible for our 25th annual contest. Filing deadline is Oct. 1. For copy of the questionnaire, write: Oswald Stewart, Buildings Editor, FACTORY, 330 W. 42nd St., New York.—ED.

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For more facts circle 454 on Reader Service Card

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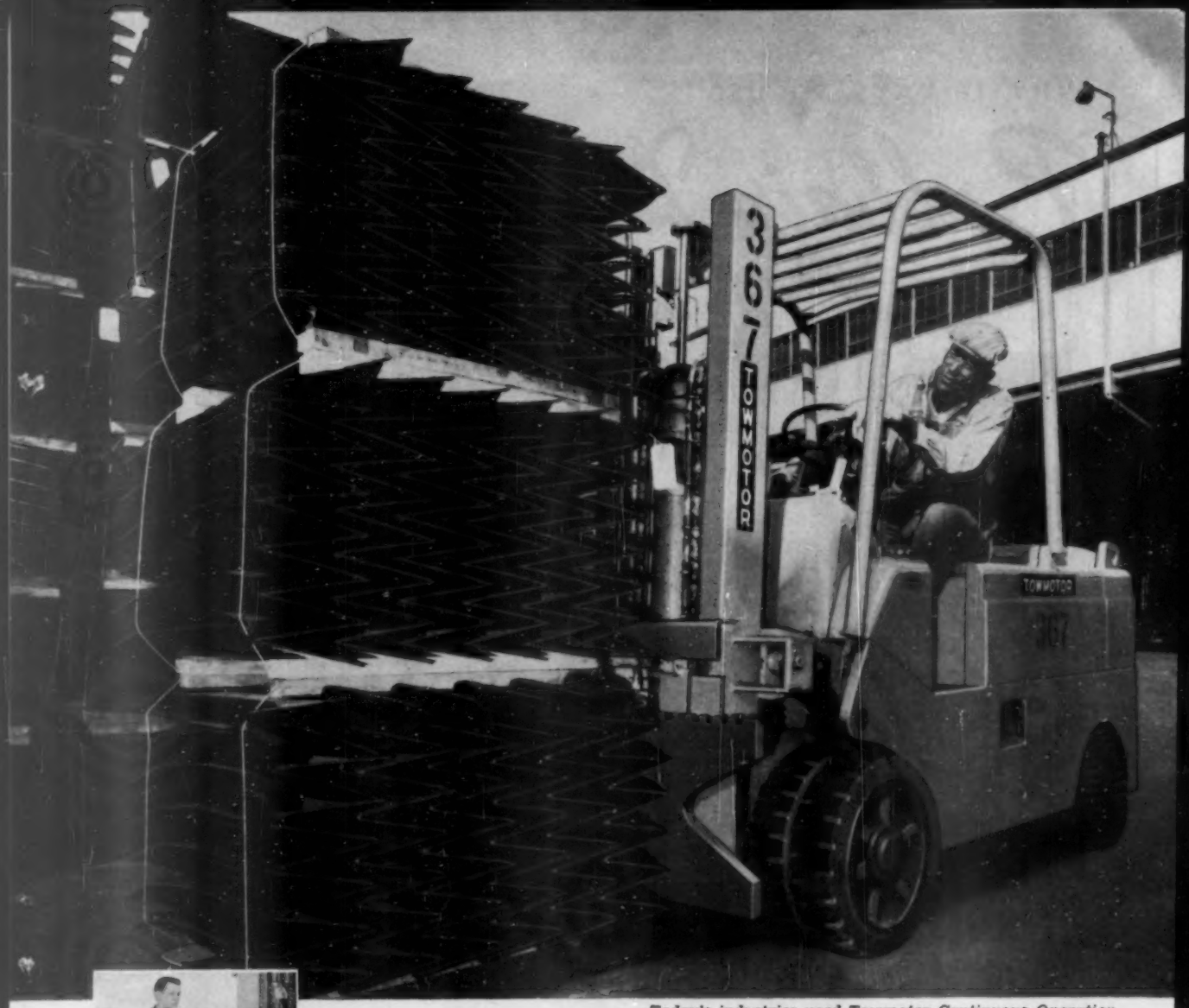


Today's industries need Towmotor Continuous Operation

Easy on muscles! Towmotor improved Power Steering triples driving ease; Towmotor TowmoTorque Drive adds cushioned "creep control" unequalled in the industry.

Get under hood fast! Towmotor tilt-back seat and slip-socketed panels permit 23-second access to entire engine and parts without tools . . . a mechanic's dream!

Low up-keep assured! New functional-design construction introduced in Towmotor "Pace-Maker" Series adds extra economy to Towmotor Continuous Operation. Model 540 shown.

It's a New Towmotor "Pace-Maker"...built to last!

The stamina of this "Pace-Maker" Series Fork Lift Truck will hardly surprise you —it looks like it's built for more rough-and-tumble treatment than you'll ever give it, and it is.

But slip into the driver's seat and you'll marvel. Towmotor TowmoTorque Drive makes this compact lift truck handle 5½-ton loads with unmatched ease! Operator "inches" gently up to tier — or skims over any terrain — with minimum effort. Saves extra maintenance dollars all the while.

Send for Towmotor Booklet SP-23 or ask for a convincing demonstration—or do both.

Leaders for 39 years in building Fork Lift Trucks, Tractors and Carriers

TOWMOTOR THE ONE-MAN-GANG® **-GERLINGER**

Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation, Cleveland 10, Ohio

☐ Send free Towmotor Booklet SP-23

☐ Send free Certified Job Studies relating to our business, which is:

Name_____

Company_____

Address_____

Mail to **TOWMOTOR CORPORATION,** Cleveland 10, Ohio

WHY IT PAYS TO USE

Rubbair Door

the true door — not a curtain, that saves hundreds of dollars in industrial door maintenance costs!

- Flexible
- Shock Resistant
- Silent
- Damage Proof
- Lightweight
- Low Maintenance
- Fast Action
- Safe

One of several Rubbair Door installations at the Strathmore Paper Co., West Springfield, Mass.

READ THIS ACTUAL CASE HISTORY—

"The installation of Rubbair Doors has really solved three problems for us," said Mr. J. S. Mudgett, Chief Engineer, Strathmore Paper Co., West Springfield, Mass. "The first problem was the necessity for a door that would permit a free flow of heavy fork-lift truck traffic without requiring a stop to mechanically operate a conventional type door. The second problem was considerable heat loss to open warehouse area which was reduced by fast closing action and air seals. The third problem was maintenance costs which have been reduced because of the flexibility of the door. Of course, other benefits have been realized such as safety for workmen as well as a considerable reduction of dust and dirt from the loading platform."

FACTS you should know about RUBBAIR ® DOOR

Industrial door installations are subject to continual battering and abuse by hand carts, fork trucks, and other materials handling conveyances. They soon break down and need repair. The use of iron-clad or wood doors has been unsatisfactory because of limited life under such conditions. Another contributing factor to high maintenance costs has been hardware replacement of broken hinges, sheared screws, and splintered jambs. After many years at industrial locations, subject to the toughest abuse, this on-the-job testing has proved the value of a true flexible door that can absorb tremendous pounding and punishment. The effectiveness of each Rubbair Door installation leads us to the following conclusions: (1) The design of Rubbair Door assures high ability for shock absorption, (2) The rugged construction of Rubbair Door has cut maintenance costs over 75% and, (3) The use of Rubbair Door reduces load and equipment damage, injuries to personnel, repair down-time and constant replacement of expensive hardware.

Write today for your free illustrated folder showing how you can get the most from Rubbair ® Doors.

RUBBAIR DOOR DIVISION
MANUFACTURING COMPANY, INC.
60 REGENT STREET, CAMBRIDGE 40, MASSACHUSETTS

FACTORY / LETTERS

Begins on page 6

TWO-PART REPORT

Sir:

When I filled out the questionnaire for your survey on Plant Maintenance and Engineering Practices, I asked if you would be good enough to send me a copy of the report on the survey results. Your acknowledgment said you would.

Your August issue has an article ("Where Industry Stands Today on Electrical Management," p. 52) based on the latter half of the survey questionnaire. But so far I have not received the report. Has something gone wrong?

(Name withheld)

► Nothing wrong at all. Second part of our report ("Where Industry Stands Today on Maintenance Management") begins on p. 90 of this issue. Survey respondents (who will not be identified under any circumstances) will receive a reprint of the combined reports just as soon as it is ready—normally, it takes about three weeks after publication of the issue. Individuals who filled out questionnaires will receive the combined reprint with our compliments and thanks. To others, the price is $1, or 50¢ each for either the electrical or maintenance section of the report. Write: Reader Service Dept., FACTORY.—ED.

CREDIT UNIONS

Sir:

An article in your April 1958 issue (p. 134) is titled "Credit Unions Are Booming." There is no question about that. But nowhere in your story do you tell why . . .

It is pointed out that very often there is free rent and free clerical help, but you do not point out that these are also Federal income tax free . . . Those business men who have been recommending Credit Unions would certainly talk differently if some of their competitors could eliminate most of their overhead, their rent, and their tax obligations, and then go out and accuse competitive business firms of profiteering.

If you have any comment about

3M quality products make the difference...

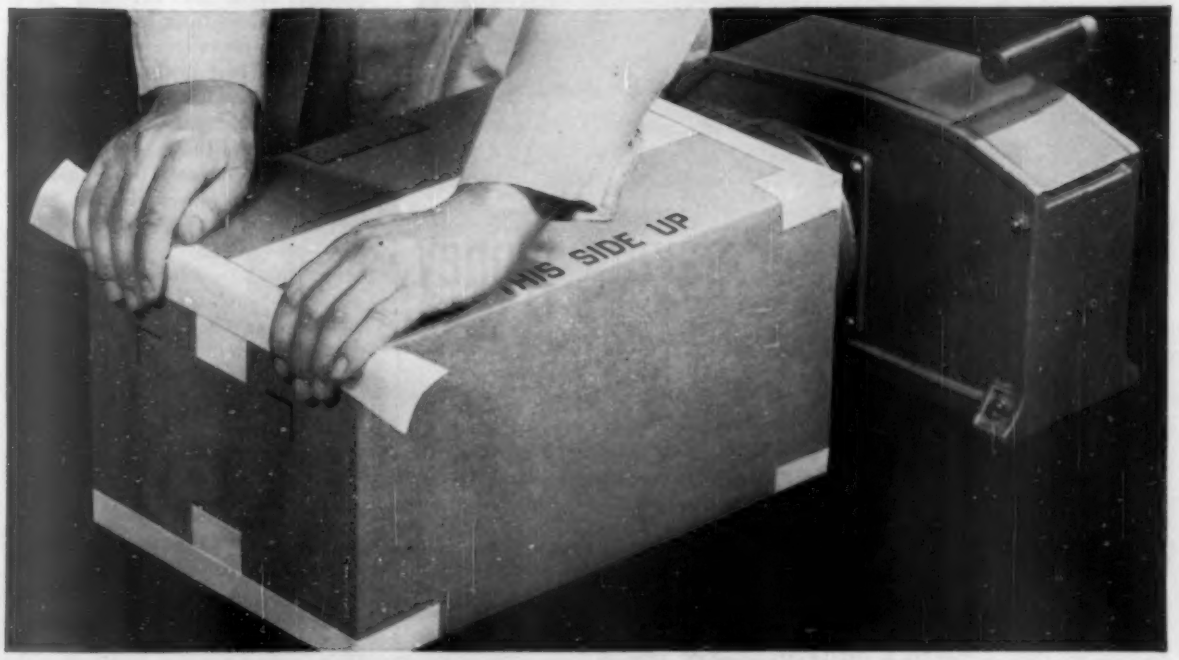
No "gummed-up" cartons with this "SCOTCH" Brand Tape!

Now . . . low-cost carton sealing—fast and clean! "Scotch" Brand No. 260 Carton Sealing Tape does it without fuss or muss. No liquids or other adhesive activators needed. This extremely tough tape has a tight-sticking pressure-sensitive adhesive to keep a shipping carton *closed* until the recipient *wants* it open. It is strong (actually reinforces the carton); long-aging; and is approved for government packaging under Spec. PPP-T-76.

"Scotch" Brand Carton Sealing Tape No. 260 is another example of the many specially developed tapes in the world's most complete line. Among others in the "Scotch" Brand line are tapes that are as strong as steel . . . tapes that stick on both sides . . . tapes that resist acids, alkalies, and solvents . . . tapes that perform even under the heat of welding operations . . . tapes in color . . . tapes that can be printed. Most of these can be dispensed or applied semi or fully-automatically.

For complete information, ask your "Scotch" Brand Tape distributor, or write 3M Company, 900 Bush Ave., St. Paul 6, Minn., Dept. CO-98.

"SCOTCH" is a registered trademark of 3M Co., St. Paul 6, Minnesota.



When tape costs so little, why take less than...

REG. U.S. PAT. OFF.
SCOTCH BRAND **Carton Sealing Tape**

Minnesota Mining and Manufacturing Company

...where research is the key to tomorrow

3M COMPANY

Picture of worker saving money

He's helping cut waste 20% with Steiner roll towels

Paper towel expenses getting high? You can cut towel waste with a Steiner controlled roll paper towel dispenser. Here's how: User pulls from the cabinet only the amount of toweling he needs . . . no grabbing of a handful of towels that aren't needed, half used and then discarded. Still, user gets plenty of towels for thorough drying job. You can save 20% or more in towel costs with Steiner controlled dispensers.

Install them on a trial basis and see how you save. For more information contact your janitorial supplier or sanitary paper distributor or write Steiner Company, 740 Rush Street, Chicago 11, Illinois.

STEINER

STEINER COMPANY
740 RUSH STREET, CHICAGO 11, ILL., DEPT. 9B

Please send me free bulletins on Steiner controlled roll paper towel dispensers.

NAME_____

COMPANY_____

STREET_____

CITY_____ ZONE____ STATE_____

this story, we would be glad to have it to pass on to the folks who are asking us "what goes on" when a McGraw-Hill publication falls into this kind of a trap and begins promoting socialism or worse in the banking and financial fields.

Jack Reich
Executive Vice President
Indiana State Chamber of Commerce

► We can't agree we've fallen into any kind of trap. We reported a survey of practices of almost 8000 credit unions that—like 'em or not—do exist in the manufacturing industries. Whether the story is palatable or not, it is legitimate news. Our purpose was simple: to promote the understanding of an audience of management men on something they should be informed about.

You make an excellent point about freedom from taxation, overhead, etc. However, we feel there is an important distinction between the activities a company encourages for the morale and well-being of its employees and those in which it engages on a business basis in competition with others. In the latter two cases, your thesis is sound. But we think it's out of order to accuse some 8000 manufacturing companies of promoting socialism in the banking and financial fields because they encourage setting up credit unions for their employees.—ED.

BRONX CHEER—AT US

Sir:

Each time I look through a new copy of FACTORY I make a promise to myself to write the editors concerning the need for plain good grammar . . . as well as for correct technical information.

Generally, the entire magazine seems to be written as if it were one big telegram; using short, curt, unfinished sentences.

Neil November
Friedman-Marks Clothing Co., Inc.
Richmond, Va.

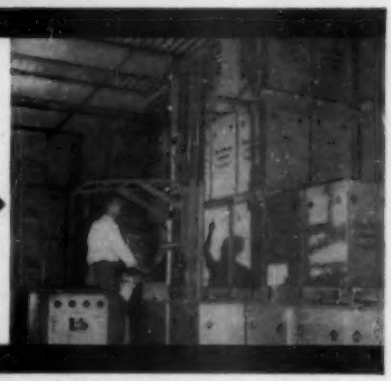
► Sorry if our style offends. What we're after is easy reading. We're trying to write pretty much the way people talk. In short sentences. In-

Whatever you handle — do it better the L-S way...

PAPER A New York lithographer turns to L-S electrics, free from dangerous fuel and fumes, for safe quick routing of tons of paper and paperboard daily. For complete information, check Case History #276-1 on coupon below.

COILS A Michigan manufacturer reports increased handling efficiency plus a warehouse space saving of 4500 square feet — thanks to L-S electrics. Check Case History #349-1 on coupon below.

HOUSEWARES A Detroit warehouse finds the ideal balance of electric and hand-operated equipment in L-S Products for the speedy handling of assorted odd-shaped goods. Check Case History #507-1 for further details.



Experienced L-S representatives and the complete job-tailored line of L-S materials handling equipment can provide a better answer to any handling problem.

The COMPLETE Line of Materials Handling Equipment

The "MASTER" Line **LEWIS-SHEPARD®**

LEWIS-SHEPARD PRODUCTS, INC. • 159 Walnut Street • Watertown 72, Massachusetts

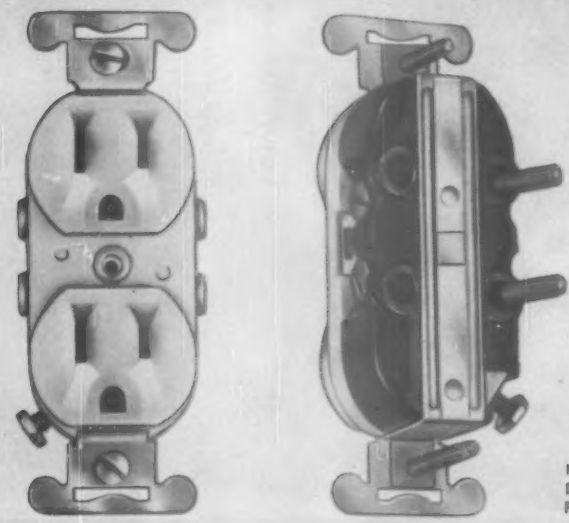
Please send me the following Case Histories showing how LEWIS-SHEPARD saved dollars by the economical handling of

☐ PAPER (#276-1) ☐ COILS (#349-1) ☐ HOUSEWARES (#507-1)

NAME..... TITLE.....

COMPANY..... CITY..... ZONE.... STATE.....

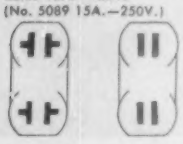
NOW! Leviton adds back and side wired devices to the specification (5000) grade line!



No. 5096
Duplex U-Ground
Parallel receptacle

LOOP IT OR DO IT THE EASY WAY! Leviton back-and-side wired devices give you a connection that is not only easy to make, but time-saving, too! Loop it, or clamp it for back-wiring. Either way you are assured the right kind of power to carry heavy duty loads. Here is the utmost in performance at minimum cost...with absolutely no compromise in quality!

Back-and-Side Wired Devices Now Available:
Rated 15A.—125V.
(No. 5089 15A.—250V.)



No. 5062 No. 5074

No. 5088 No. 5089

Just Check These Features:

- All devices have double-wiping phosphor bronze contacts.
- Plaster ears—wide and break-off types.
- Grounding Screws on all U-Ground devices.
- Entire assembly solid-riveted for permanence.
- Heavily sectioned molded phenolic bases.
- Full underslung straps, completely *rust-proofed*.
- Easy back-wired installation for up to No. 10 wire.
- Strip gauge for obtaining maximum clamping.
- Individually packed with mounting screws attached to straps.

Meet U. L., C. S. A., and Federal Specifications
All back-and-side wired devices in brown and ivory.

Listed by Underwriters' Laboratories

Your best jobs are done with...
LEVITON MANUFACTURING COMPANY, INC.
Brooklyn 22, New York

LEVITON

Chicago Los Angeles • Leviton (Canada) Limited, Montreal
For your wire needs, contact our subsidiary AMERICAN INSULATED WIRE CORP.

FACTORY / LETTERS

Begins on page 6

complete sentences. Elliptical phrases if need be. So the average reader can read and get the meaning fast.

The payoff question is, "Are we right?" Readership studies indicate we are. And so do most of the comments we get from readers and from authors whose work has been restyled for FACTORY.

Incidentally, we do know our grammar — even though we often take liberties with the brand our grade-school teachers taught, in the interest of clarity and faster reading. Perhaps the hard-bitten engineers on our staff—who certainly never think of themselves primarily as "writers"—are not Ph.D.'s in English. But our Manager of Presentation is; and he taught English at two leading colleges into the bargain. With constant "retraining" by our private professor (aided by other English majors and journalism graduates on the staff), even our engineer-editors can acquit themselves remarkably well on the semantic nuances and grammatical intricacies of the Queen's English. They can—and do—do even better at making themselves understood in colorful and colloquial but straightforward American.

Obviously, a matter of taste is involved here. You prefer the more conventional style to which you are accustomed. That, clearly, is your right. If we should find that a majority of readers share your views, our staff has the knowledge and ability to change. And will.—ED.

OLD ISSUES NEVER DIE

Sir:

Could you, at this late date, inform me where I could receive further information about setting standards in our maintenance department through the use of the Universal Maintenance Standard System?

W. J. Venne
Motion Time Study Engineer
Crane-Pacific Co., Colton, Calif.

► **Best bet is to write the author and man who "invented" the system: Mr. Harold B. Maynard, President, Methods Engineering Council, 718 Wallace Ave., Pittsburgh.—ED.**

how a Hoffman Industrial Vacuum System conquered graphite dust problems

At American Smelting And Refining's Barber, New Jersey plant, a U.S. Hoffman Industrial Vacuum System eliminates graphite dust from the atmosphere while graphite dies are being formed. This unique system removes graphite chips and dust *right at the cutting tool*, and pipes the waste material to a central disposal location.

If you have a dust problem *of any kind*, ask a Hoffman Representative to show you how plant managers of leading companies use Hoffman Industrial Vacuum Systems to:

- **Improve working conditions**
- **Reduce in-plant maintenance costs**
- **Provide better housekeeping at low cost**
- **Reclaim valuable materials**
- **Eliminate fire and explosion hazards**
- **Salvage raw materials**

HOFFMAN INDUSTRIAL VACUUM CLEANING SYSTEMS . . . custom designed for your needs

Hoffman air appliance engineers will be glad to make a survey of vacuum cleaning possibilities in your plant. No obligation of course. Write for Catalog AB-100.

AIR APPLIANCE DIVISION U.S. HOFFMAN MACHINERY CORPORATION 103 FOURTH AVENUE, NEW YORK 3, N. Y.

Other industrial equipment — **PNEUMATIC CONVEYING DIVISION** — Custom Built Systems — **INDUSTRIAL FILTRATION DIVISION,** Machine Tool Coolant Clarifiers — Solvent Recovery Systems — Oil Conditioners.

Tuffy. Tips On

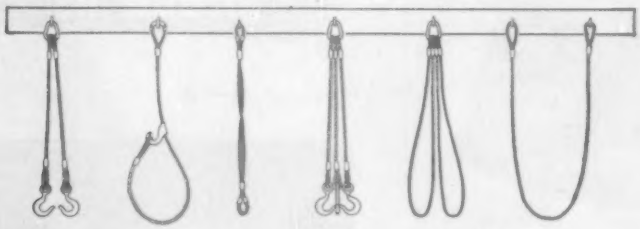
SAFE USE OF SLINGS AND HOIST LINES

Half of All Workmen's Compensation Cases in Ontario Caused by Materials Handling Accidents

Officials of the Workmen's Compensation Board at Toronto recently reported that 50% of compensation cases in 1956 (excluding accidents in which workmen were struck by something) were caused in materials handling work. Back injuries totaled 16.7% of compensated cases. Medical aid and compensation for back injuries added up to $4,520,000.

That's a high price to pay, in human disability and suffering as well as in dollars, for avoidable accidents. It can be greatly reduced if safe methods of materials handling are more widely adopted and more diligently applied.

Here are some of the things you can do to reduce hazards of faulty equipment and operation:



Safety Begins with "Good Housekeeping"

Too often, slings are dumped in a corner of a storeroom after use. When they're needed again, it's difficult to untangle them and the wrong sling is chosen because it is easiest to get to. Shown here is a rack which makes orderly storage easy. Such tidiness makes for greater efficiency and safety all around.

1. **Keep slings,** ropes, chains, and cables in orderly storage when they're not being used. Such equipment can be damaged between lifts if it is left in haphazard piles.
2. **Don't allow** hitching equipment to remain loose on crane hooks, hoists and loads when not in use.
3. **Check hitching** equipment before using. Inspect it again before return to storage.
4. **Shake out** kinks and twists **to prevent kinked slings** before loading slings. Never use a kinked sling. Remember it is next to impossible to kink a Tuffy Sling in normal use; and when kinks do occur, they can be smoothed out with no serious damage.
5. **Make sure** crane and hoist controls are in best working condition. Test all equipment frequently.

FREE! Tuffy Sling Handbook

Gives complete data on Tuffy Slings — types, dimensions, weights and rate loads. Plus a complete rigger's manual and engineers notebook on wire rope constructions and specifications. Write for your copy now.

You're On the Safe Side With Tuffy. Slings

Maximum safety is one of the many benefits you get in Tuffy Slings. Here are some of the reasons why:

Pressed-On Streamlined Ferrules

Tuffy's pressed-on ferrule gives the tucked eye splice 100% of fabric strength. Applied under great pressure, the steel ferrule literally flows into spaces between wires and strands, developing friction force equal to full fabric strength. Streamlining eliminates snags and projections that might injure hands.

Tuffy's Exclusive Fabric

Only Tuffy gives you the exclusive, patented, machine-braided fabric that combines extra strength and flexibility never before built into any sling. It makes knotting and kinking next to impossible, and if kinks do occur they are easily smoothed out.

Your Tuffy Distributor Will Help You Save Money

He's stocked to give you fast delivery on Tuffy Slings, Hoist Line and other Union Wire Rope. The longer life and greater safety of Tuffy can reduce your operating costs. Get in touch with your Tuffy distributor now.

union Wire Rope corporation

SUBSIDIARY ARMCO STEEL CORPORATION

Specialists in high carbon wire, wire rope, braided wire fabric, stress relieved wire and strand

2234 Manchester Ave. **Kansas City 26, Missouri**

For more facts circle 462 on Reader Service Card

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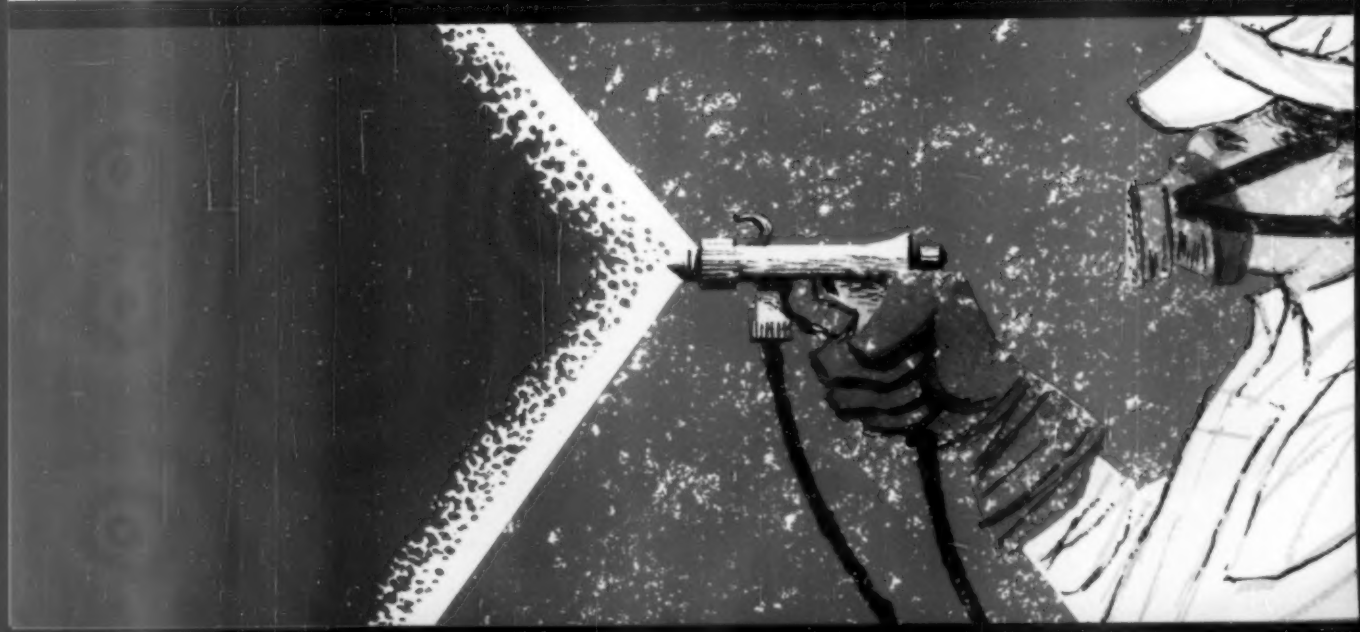
NEW
GULF METALCOAT A

protects against rust and corrosion up to 10 times longer



9 years of intensive test exposure prove that new

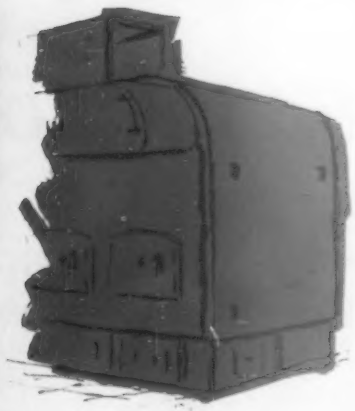
GULF METALCOAT A

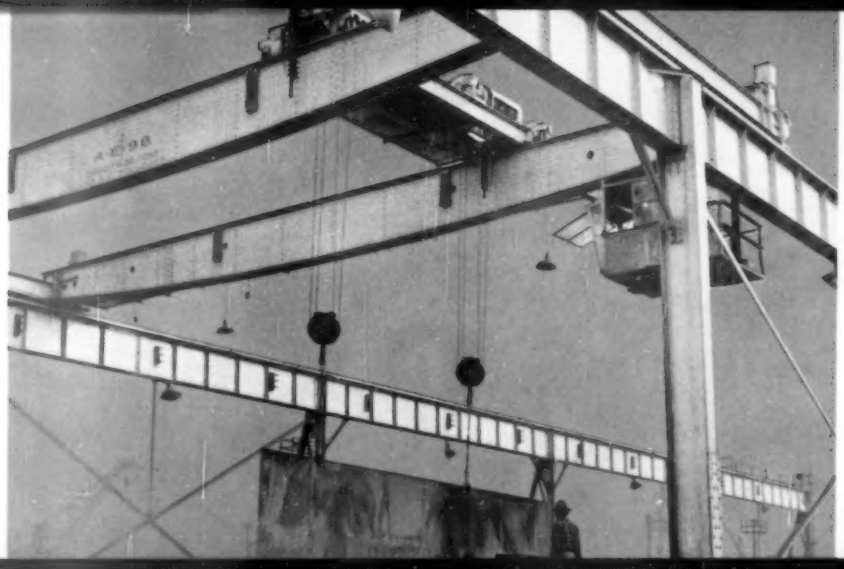
- **protects metal surfaces against rust and corrosion up to 10 times longer**
- **protects under the most severe exposures in industrial and marine atmospheres**
- **is easy to apply by brushing, spraying or dipping—to either smooth or rough surfaces**
- **is unaffected by temperature changes**
- **resists the abrasion of normal handling—yet can be easily removed by a petroleum solvent**
- **costs less**

New Gulf Metalcoat A is a revolutionary new aluminum pigmented liquid coating that has been passing the most rugged marine and industrial tests for 9 years! Salt spray tests at Wrightsville Beach, N. C., revealed that Gulf Metalcoat A gives from 7 to 10 times greater protection than that afforded by competitive products. In a Philadelphia shipyard, overhead cranes have been perfectly protected by Gulf Metalcoat A for 4 years. Ships have used the new coating on stacks and other exterior surfaces exposed to salt spray atmosphere—with outstanding success.

For long-lasting protection, use new Gulf Metalcoat A on piping, fences, storage tanks, sheet metal buildings, metal roofs, machine parts, land transportation equipment, ships, barges, stacks and other marine applications.

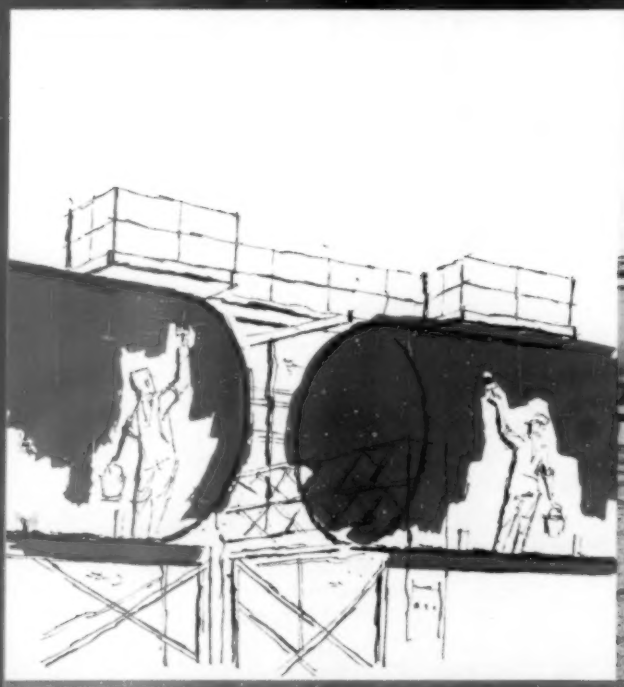
For temporary protection during storage or shipment, Gulf Metalcoat A is excellent for structurals and steel components of all kinds.

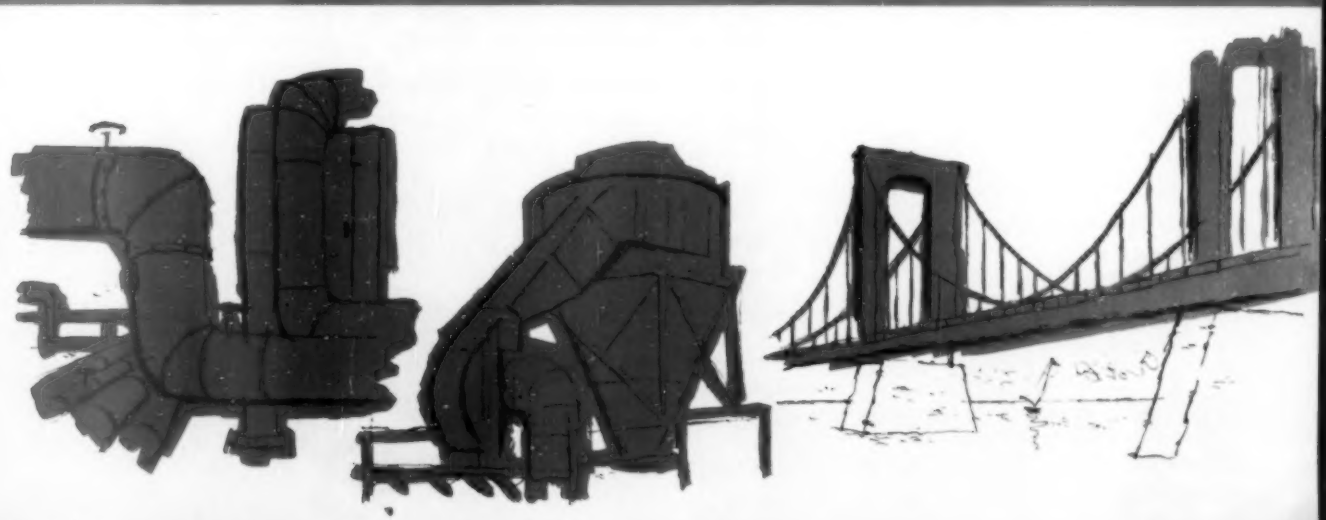


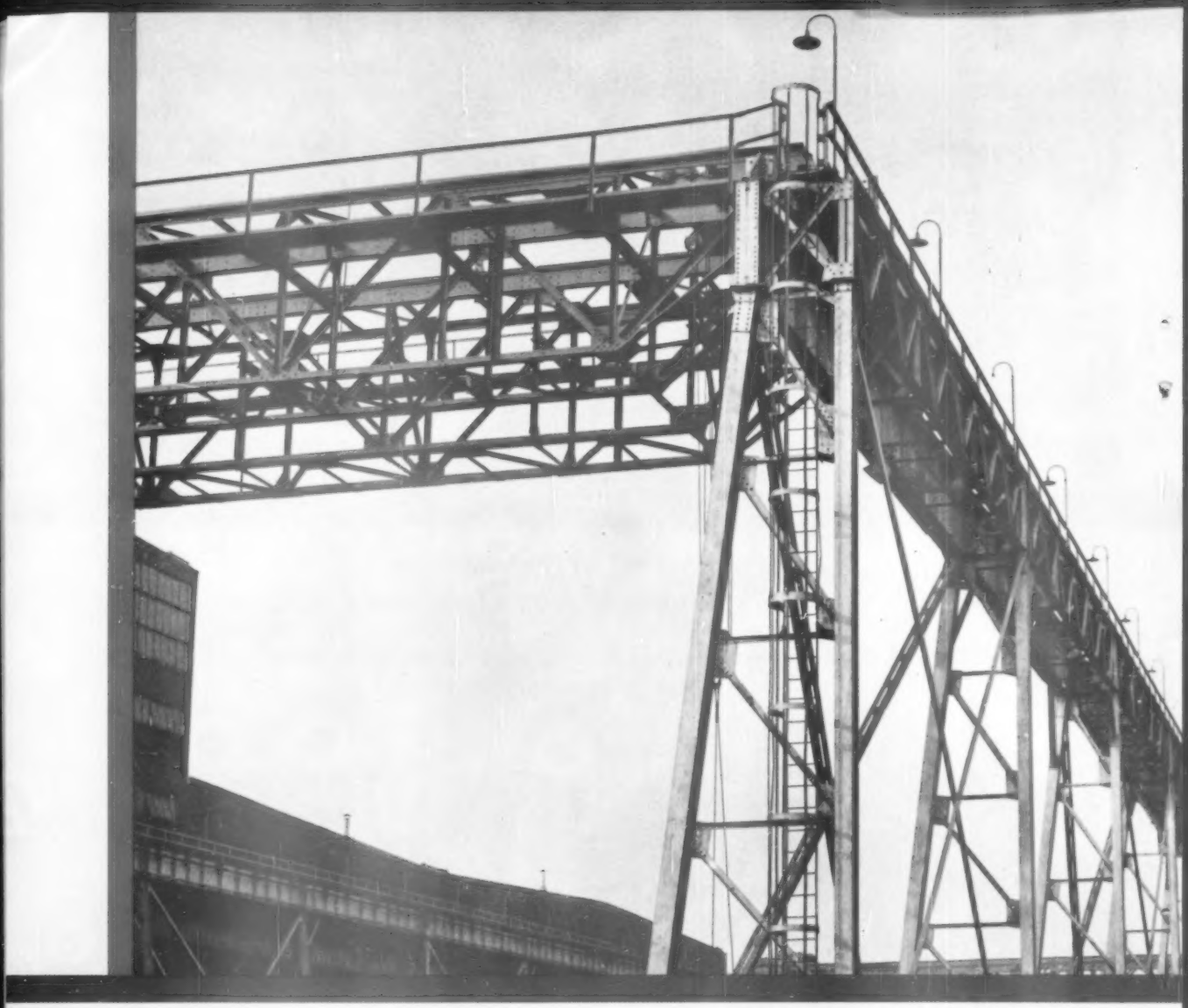


Gulf Metalcoat A has protected this steelwork for 4 years—above sulfuric acid pickling tanks! Coating is still in excellent condition.

These building exhaust ventilators, located in a corrosive atmosphere, are kept free from rust and corrosion by Gulf Metalcoat A.







After 2 years' exposure, Gulf Metalcoat A is still giving exceptional protection to the structural steelwork supporting this 40-ton overhead traveling crane.

GULF METALCOAT A is available now

Gulf Metalcoat A is now available through your Gulf Sales representative. For more information, call your nearest Gulf office, or mail the coupon.

GULF OIL CORPORATION
Dept. DM, Gulf Building
Pittsburgh 30, Pa.

Please send me price information on new Gulf Metalcoat A.

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

GULF OIL CORPORATION
Dept. DM, Gulf Building
Pittsburgh 30, Pa.

GULF

SP 9324

SLOW LEAK IN YOUR TOWEL BUDGET?

HALT IT WITH THIS NEW DELAYED-FEED DISPENSER

Fresh towel appears only when special fin, exclusive with Nibroc, is pressed.

Money dribbling away because paper towels are being wasted. Stop such waste and slash towel consumption *up to 20%* with the exclusive *new Nibroc® delayed-feed economy towel dispenser*—for use with any white or natural shade Nibroc multifold towel. No waste butt rolls—no time device to get out of order. Trouble-free waste-control mechanism discourages "two-or-more-pulls"—users enjoy Nibroc towels that are unexcelled in absorbency, strength, softness. Mail the coupon today for case histories showing substantial dollar savings.

Brown Company
150 Causeway St., Boston 14, Mass.

Please send me case-history proofs of 20% savings with new NIBROC DELAYED-FEED ECONOMY TOWEL DISPENSER.

NAME_____

COMPANY_____

STREET_____

CITY_____ STATE_____

BROWN COMPANY

General Sales Offices: 150 Causeway St., Boston 14, Mass.
Mills: Berlin and Gorham, New Hampshire

NIBROC TOWELS • NIBROC TISSUE • NIBROC CABINETS • NIBROC WIPERS

JET WINGS
strengthened like swords

How the new Douglas DC-8 draws strength from the world's tallest bottom-entry furnace

As fire fuses vital toughness into a sword, a bath of heat in this giant Despatch furnace gives the knife-like wings of the new DC-8 strength to withstand near-sonic speeds.

Douglas engineers were intent on building great strength and flex into the DC-8's wings and fuselage—to resist the buffeting of the most powerful air torrents. So Douglas called on Despatch for a huge, but delicate heat-treating system. Despatch responded by designing and building Douglas the world's tallest, vertical, bottom-entry furnace, with elevator system. Let's watch it at work:

Parts to be solution treated roll into a completely-enclosed loading area on a 24-foot long truck. Far above, two great doors slide open and the mammoth elevator eases the heavy load up into the heat chamber. The doors seal shut. An intricate reactor system sprints the temperature of the aluminum and steel load to 930° in just 15 minutes. (The furnace can hold temperatures up to 1200° indefinitely with only plus or minus 4° variations.)

The doors swing open and the heat-treated parts descend 28 feet in five seconds. With a roar the vital parts are immersed in the quenching tank for a scientifically-controlled soaking. Seconds later the elevator "surfaces" and returns the toughened wing and fuselage sections to the loading floor.

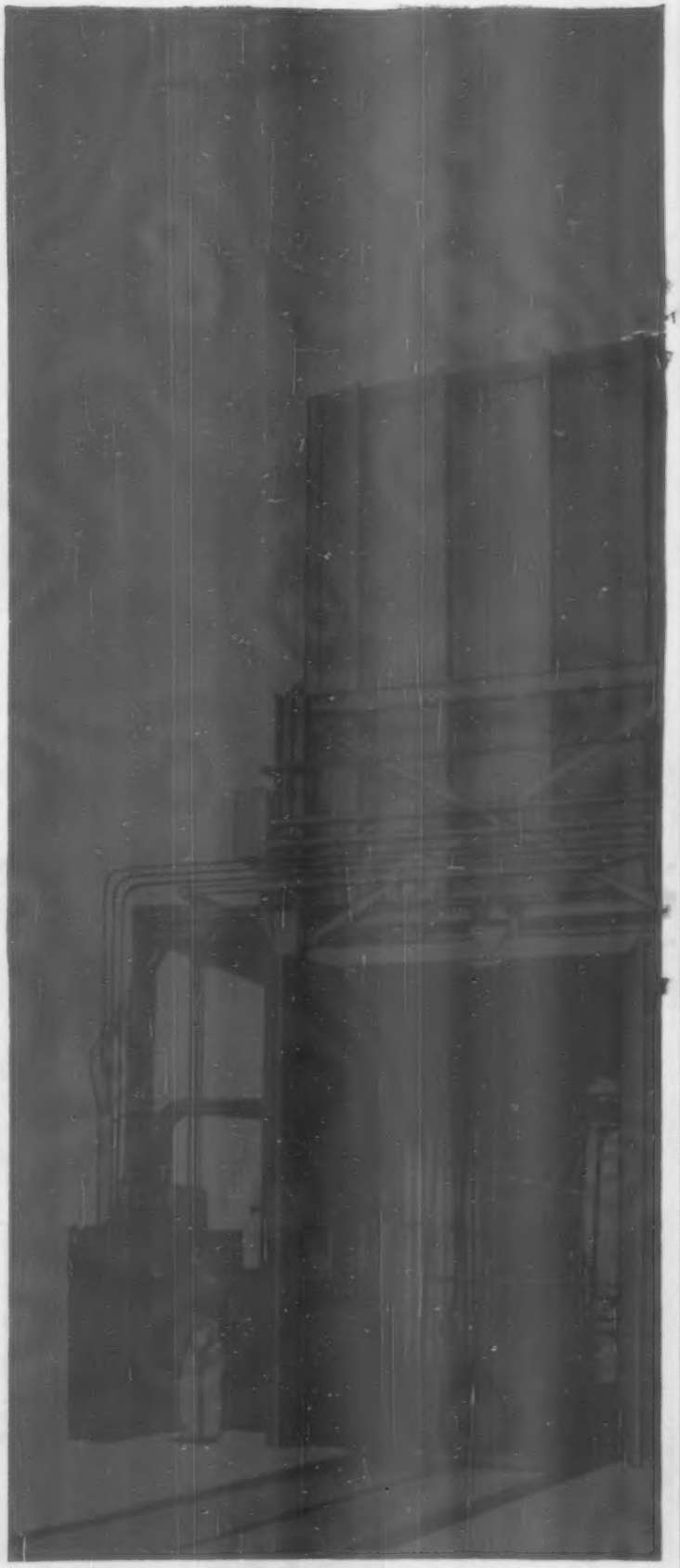
What sounds like a task for a 10-man crew is handled by one man who runs the giant Despatch furnace. One man pushes the buttons that radiate new strength and flexibility into the nation's most modern airliner.

For full facts on the capabilities of all Despatch heat treating and finishing products and systems, write or call . . .

DESPATCH OVEN COMPANY

619 S.E. 8th St., Minneapolis, Minn.

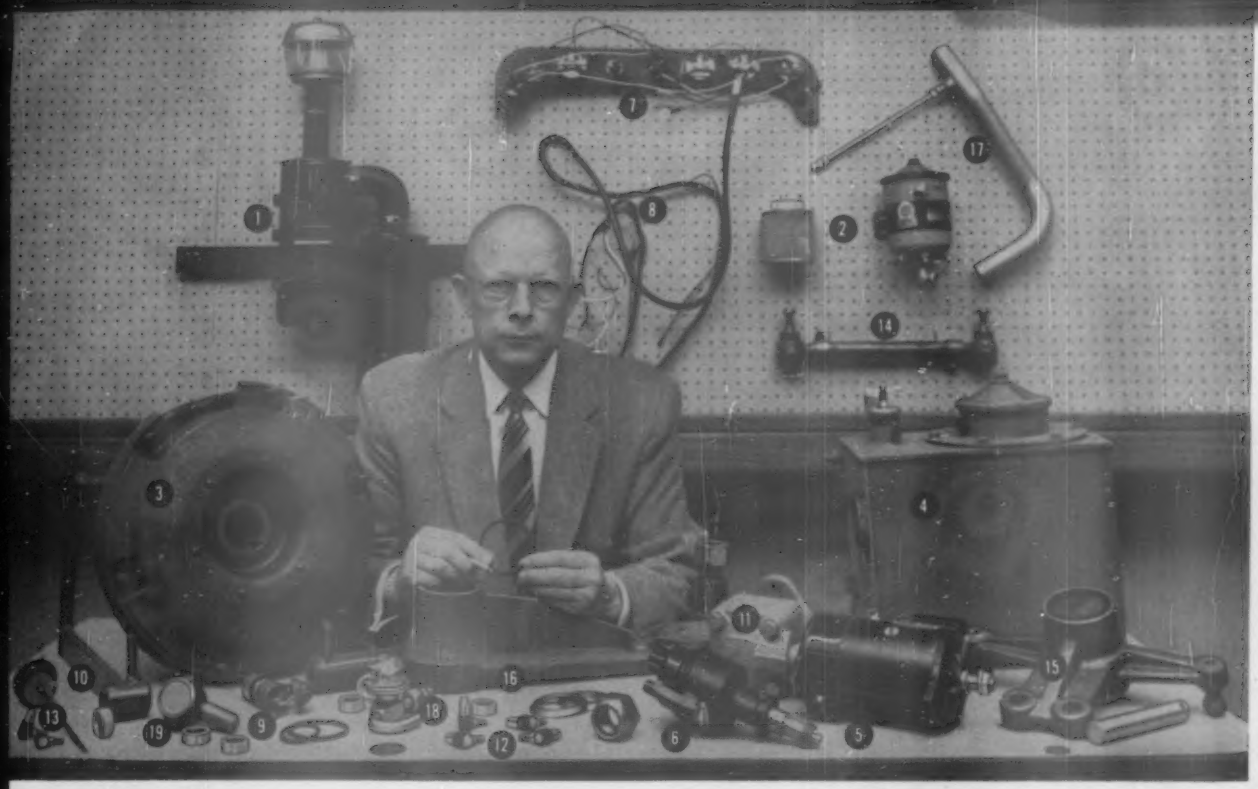
Department 71A



DESPATCH
DESPATCH

Bottom Entry Furnaces also custom built by Despatch for other industries

DESPATCH
OVEN
CO.



"Why are so many PROTECTIVE features engineered into the new H-25 PAYLOADER?"

This question is frequently asked of Ralph Beyerstedt, Executive Vice President of The Frank G. Hough Co. because of his more than twenty years of experience in charge of engineering.

"During the development of the H-25," Mr. Beyerstedt explained, "as soon as it became evident that we were going to obtain the increased capacity, production, ease of operation, speed and mobility we sought, our engineers then gave major attention to protective features for operational insurance against wear, maintenance, abuse, downtime and the like.

"The more than 10,000 small HA "PAYLOADER" tractor-shovels that we have produced for steel mills, foundries and chemical and fertilizer plants operate under conditions which continuously subject the machines to dust, dirt, powder and foreign materials.

"Because these are sources of major headaches for owners and operators," said Mr. Beyerstedt, "we have given extra special consideration to elimination of the problems they cause.

Dozens of Protective Features

"Starting with the *triple* air cleaning system (1) we have a precleaner and dual oil-bath air cleaners for engine intake, and crankcase breather tube (17).

"Next, each of the three oil systems is equipped with a cartridge-type oil filter (2). These take care of the engine oil, the hydraulic-system oil and the power-shift transmission and torque converter oil.

"The self-adjusting, hydraulic service brakes (3) are *sealed* and the parking brake is enclosed in the transmission and operates in oil for greater dependability.

"The reservoir (4) of the closed, pressure-controlled hydraulic system has built-in cartridge-type filter and *sealed* dip-stick."

In discussing the components of the electrical system, Mr. Beyerstedt said, "There is a 12-volt system with the battery grounded direct to the starter housing; a non-vented, *sealed* generator (5); *sealed* ignition distributor (6); shock-mounted instrument panel (7) with solder-coated terminals and a plastic-coated wiring harness (8); *sealed* circuit breaker together with *sealed* ignition and starter switches (9) plus clutch-pressure warning device (18).

"*Sealed* teflon bushings are used extensively throughout with brake and transmission disconnect mechanism (10) and valve control mechanism (11).

"These *sealed* ball joints (12) are used with gearshift linkage and *sealed* ball joints of a different size (13) are used with the accelerator linkage.

"The steering linkage uses *sealed* ball joints on the tie rods (14), and on the drag link (19). The steering bell crank (15) is *sealed*, also the spindle and kingpin assemblies.

"The boom arm mechanism has tapered roller bearings and dust covers on the bell cranks (16) and *sealed* mated bronze and steel bushings plus O-ring seals at all major pivot points."

Now, What About Production?

The carry capacity of the H-25 "PAYLOADER" is 2,500 lbs.—25% greater than has ever before been available in a tractor-shovel of its size and maneuverability, yet it easily loads and unloads box cars with narrow 6-foot doors. It is the only loader in its size range with *complete* power shift transmission—having 2 speed ranges forward and 2 in reverse. Power-steer is also standard so that operating speed and handling ease is most favorable to all-out production all day without operator fatigue.

Other plus features of the H-25 that mean more production, less maintenance and longer life are the exclusive power-transfer differential, wet-sleeve overhead valve engine, full-shift fuel capacity, 4,500 lbs. of bucket breakout force and 40° bucket tip-back at ground level.

Your "PAYLOADER" Distributor wants to show you how the greater capacity, speed and handling ease of the H-25 can cut your bulk-handling costs. Ask him about Hough Purchase and Lease Plans too. The Frank G. Hough Co., 755 Sunnyside Ave., Libertyville, Ill.

8-A-2

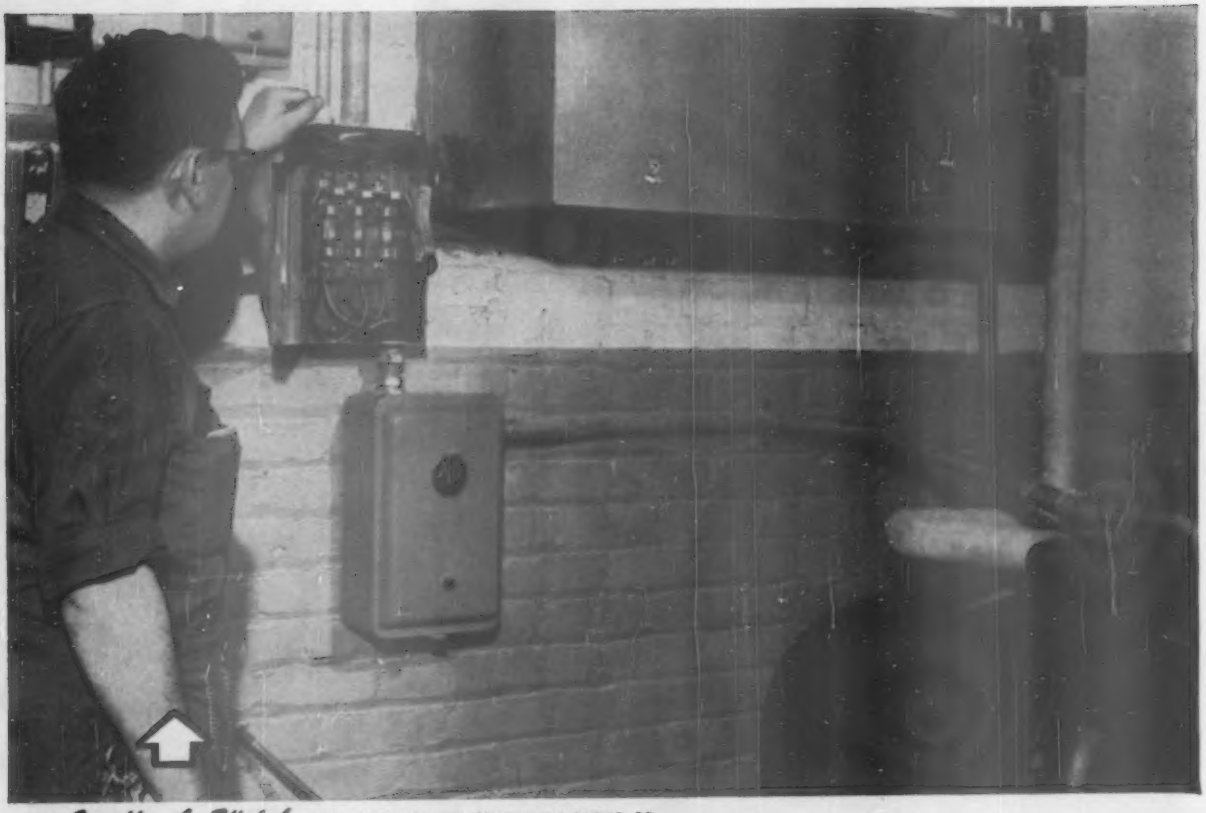
Modern Materials Handling Equipment

THE FRANK G. HOUGH CO.

LIBERTYVILLE, ILLINOIS

SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

The H-25 "PAYLOADER" is effectively shielded against dust, dirt and foreign materials by dozens of protective components.



Orville L. Welsh ASST. CHIEF ENGINEER, CONTINENTAL BAKING CO.

"Experience proved to us, Fusetron Fuses could save us money and provide safer protection." . . . *Orville L. Welsh*

ASST. CHIEF ENGINEER
CONTINENTAL BAKING CO.
TOLEDO, OHIO

CASE 1

"A refrigeration compressor of ours was frequently being shutdown because the 60 amp. protection we used just could not hold the starting currents.

"After reading over Fusetron dual-element fuse literature sent to us by our company headquarters, we tried them out with great success. In the past twelve months, we have not had to go near the switch or open its cover.

CASE 2

"In another case, Fusetron fuses saved us a considerable amount of money. We installed 600 ampere Fusetron fuses in parallel in our 1200 ampere entrance switch, rather than using the more expensive mechanical type of protective device.

"Personally, I am confident we now have better protection than we could have had with other types of protective devices."

Here's why FUSETRON dual-element fuses provide safer, more dependable and money-saving protection . . . FUSETRON dual-element fuses provide 10 point protection against electrical troubles. This is unlike circuit breakers or ordinary fuses which, except in rare cases, protect only against short-circuits.

IN ADDITION:

Fusetron fuses require no maintenance or recalibration. They are calibrated at the factory by engineers. Once properly installed, they require no inspection or down-time necessary on mechanically operated devices. There are no hinges, pivots or contacts to stick or get out of order. Dust, corrosion or oxidation cannot increase a Fusetron fuse's capacity or lengthen its blowing time.

After years of inactivity, a Fusetron fuse will give the same safe, dependable protection if called upon to open as it would have on the day it was installed.

Fusetron fuses have high interrupting capacity. FUSETRON fuses can safely interrupt severe short-circuit currents and are adequately safe to meet future circuit growth.

Fusetron fuses save on installation costs. Because their long time-lag prevents them from opening needlessly on motor starting currents or other harmless overloads, Fusetron fuses can be installed in sizes to approximate the load current. This protects against waste of space and money by permitting use of proper size switches and panels.

Why Risk Losses! One needless shutdown . . . one lost motor . . . one destroyed switch or panel . . . one burned out solenoid . . . may cost you far more than replacing all other types of protective devices throughout the entire installation with Fusetron dual-element fuses.

For Loads above 600 and up to 5,000 amps . . . Use BUSS Hi-Cap Fuses. They have an interrupting capacity sufficient to handle any fault current regardless of system growth.

They can be coordinated with Fusetron fuses on feeder and branch circuits to limit fault outages to circuit of origin.

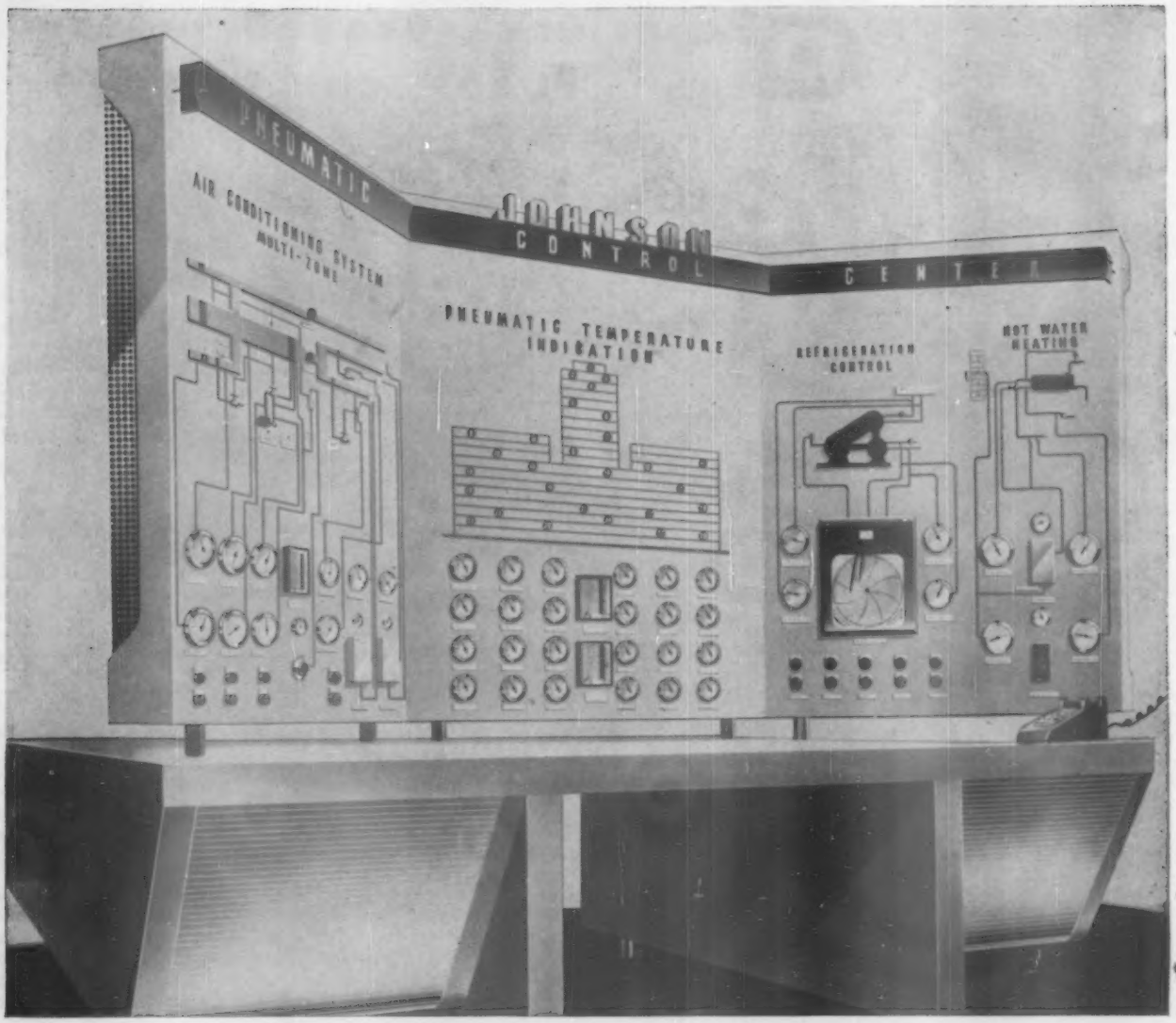
for more information write for { BULLETIN FIS on Fusetron fuses. / BULLETIN HCS on BUSS Hi-Cap fuses.

FUSETRON
PHOTOGRAPHY MARKS OF ELECTRICAL PROTECTION
BUSS

for safe, modern money-saving protection install FUSETRON dual-element FUSES and BUSS Hi-Cap FUSES throughout entire Electrical System!

BUSSMANN MFG. DIVISION, *McGraw-Edison Company* University at Jefferson, St. Louis 7, Mo.

For more facts circle 467 on Reader Service Card



Add the Final Touch of Magic

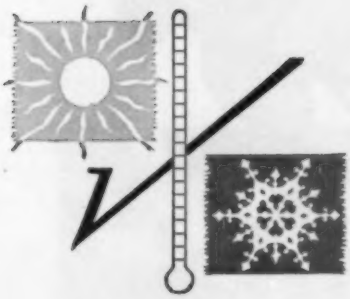
JOHNSON PNEUMATIC CONTROL CENTERS

Perfection of the Pneumatic Control Center by Johnson is bringing major savings in heating and cooling costs as well as greatly improved temperature control to buildings of all types and sizes.

The Johnson Pneumatic Control Center gives the plant engineer *centralized* supervision and regulation of the air conditioning and heating system. It provides him with a *continuous,* comprehensive visual display of all the vital operating data necessary to maintain the exact temperature conditions required. Simultaneously, it assures that all components of the system constantly function at peak efficiency.

A GLANCE TELLS ALL

By simply scanning the panel, for example, the operator can check space temperatures and water and air supply temperatures at strategic control points throughout the system. *Equally important, he can make any necessary adjustments of key temperatures instantly, right at the panel!*



Sizes, layouts and styles of Johnson Pneumatic Control Centers depend upon the specialized needs of the individual building. Each is planned separately with the building's engineer and architect.

to Your Air Conditioning!

ONE MAN DOES EVERYTHING

Thus, the operation of even the most complex air conditioning and heating systems is reduced to a one-man job! Instead of an operating *crew* checking performance and making adjustments at widely scattered locations, one man does it all from the panel! In effect, he can be in 20 or 30 or more places at once!

This coordinated, unerring control assures a uniformly ideal environment to meet every comfort or process requirement of any industrial building. It results in large reductions in fuel and power consumption and prolongs equipment life.

Remarkably easy to understand and operate, the Pneumatic Control Center requires no extensive study or training. Its components are as simple and inexpensive to use and maintain as the pneumatic controls used elsewhere in the building. Dramatic styling adds an exciting architectural asset when the Center is located in public view.

ECONOMIC ADVANTAGES IMPRESSIVE

What the Pneumatic Control Center means in terms of manpower savings, more efficient heating and air conditioning performance and greater comfort is obvious. It not only pays for itself in a hurry, but it keeps right on paying off over the life of the building!

Whether your plans involve process air conditioning, comfort air conditioning or both, investigate the unmatched advantages of a Johnson Pneumatic Temperature Control System with a Control Center. Your local Johnson branch has full details or write to Johnson Service Company, Milwaukee 1, Wisconsin. Direct Branch Offices in Principal Cities.

JOHNSON CONTROL

PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885

GILLETTE SAFETY RAZOR CO.
BOSTON, MASSACHUSETTS

as at Gillette begins with

At the headquarters of the world's leading manufacturer of shaving equipment, nine OTIS Freight Elevators play an important part in the factory operation. GILLETTE's primary interest is in keeping them operating at peak efficiency at all times. The material they move is vital to a continuous production set-up.

GILLETTE's engineering department also likes the idea of having all expenses known in advance. It permits easy budgeting on a monthly basis. There's never the annoyance of unexpected or costly repair bills that have to be added to shutdown costs. It is this double freedom from costly repairs and shutdowns that has kept GILLETTE sold on OTIS Maintenance through the local OTIS office for fifteen years.

Trouble-free freight elevator service starts with a FREE Otis Maintenance Survey and Estimate. Our approach is illustrated at the right.

Only OTIS Maintenance offers "engineered service" by the maker that maintains and assures peak performance at all times. Original or improved replacement parts are always available regardless of the age of the installation. All parts are replaced in advance of their breakdown point to maintain the maker's high standard of safety.

Your local OTIS office will gladly make a FREE Maintenance Survey and Estimate for you.

Otis **freight elevator**

"ENGINEERED SERVICE BY THE MAKER"

OTIS ELEVATOR COMPANY • 260 ELEVENTH AVENUE • NEW YORK 1, N.Y.

trouble-free elevator service
a FREE OTIS maintenance SURVEY

OTIS MAINTENANCE SURVEY AND ESTIMATE
What are your elevator maintenance costs?
It really takes an elevator man to figure costs accurately. This survey form shows the start of our procedure.

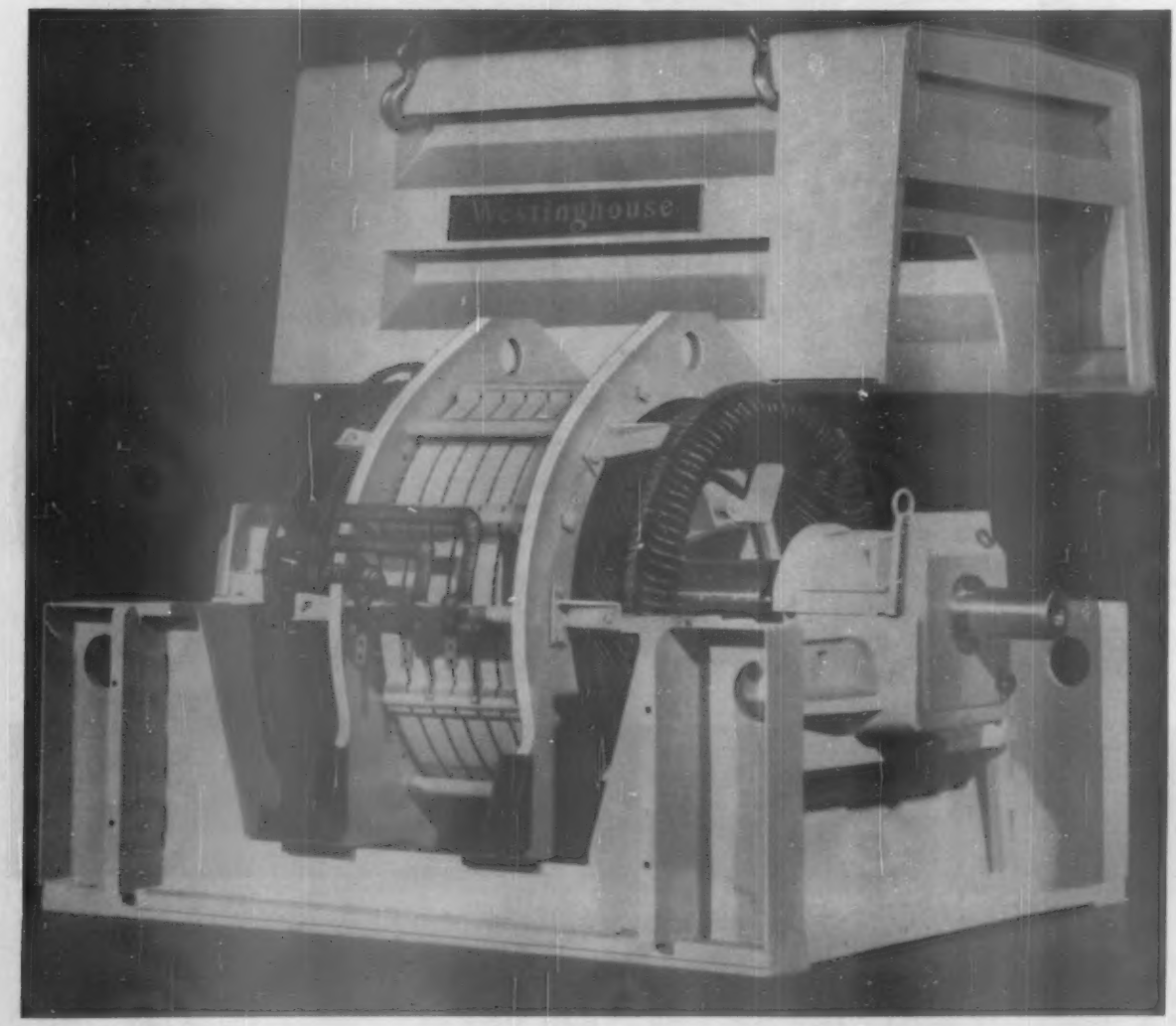
maintenance

"that keeps freight elevators running like new"

OFFICES IN 297 CITIES ACROSS THE UNITED STATES AND CANADA

For more facts circle 469 on Reader Service Card

Revolutionary new Westinghouse F/A Motor gives you five major advantages



First fully accessible motor ... takes guesswork out of inspection

For the first time in large motor history, the motor housing is completely separate from the stator, with all the benefits such construction implies.

Inspection — once a matter of partial visibility and guesswork — is now a thorough and easy operation which insures your motor investment. Advantages impossible in conventional motors are standard features of this F/A Motor design.

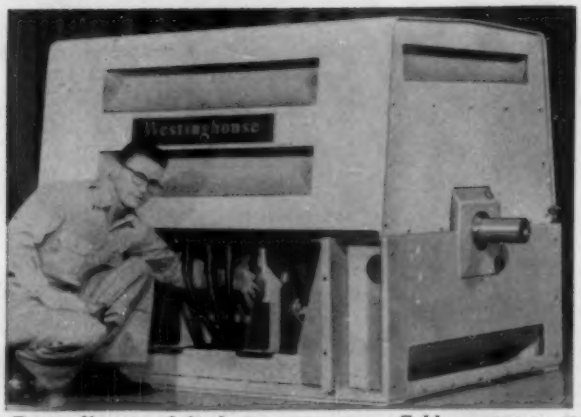
1. Full accessibility. Total inspection is possible for the first time. Enclosures are quickly removed, easily replaced. Reassembly is automatically precise.
2. Inherently quiet. Housing is isolated from the stator, reducing transmission of vibration and noise.
3. Thermalastic® insulation. Recognized as the finest available, it assures long life and protection of coils.
4. The same basic components — rotor, stator, bearings — which have made Westinghouse motors famous for long, efficient service life.
5. Easy to connect. No conduit box. Cables pass through the base bottom with extra-ample room to connect motor leads.

These and many other qualities make the new Westinghouse F/A Motor your best investment. It is presently available in large induction motors, both squirrel-cage and wound rotor. Various types of enclosures include dripproof, splashproof, weather protected, force ventilated, enclosed self-ventilated with cooler and TEFC tube type. Horsepower ratings range from 250 up to 7000, depending on speed.

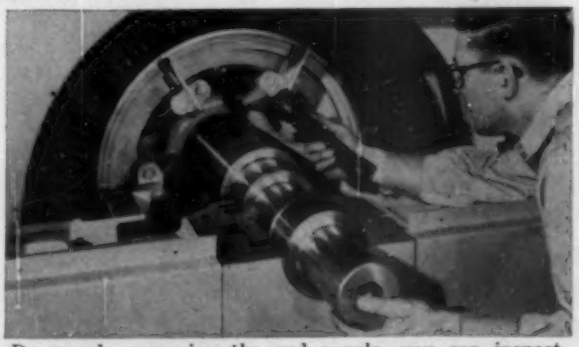
For full information, call your Westinghouse representative, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

J-15011

YOU CAN BE SURE...IF IT'S **Westinghouse**

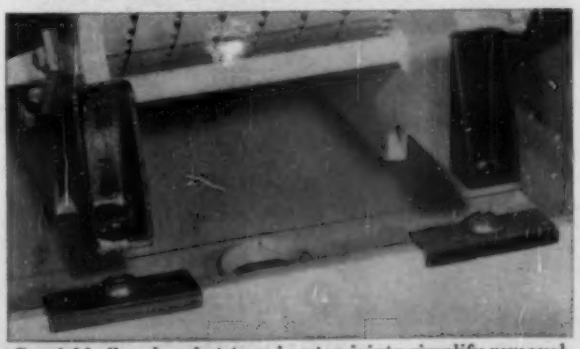


Protruding conduit boxes are gone. Cable comes up through the base, leaving plenty of room for connecting motor leads.



By merely removing the end panels, you can inspect windings and bearings.

Remove bearing cap, top bearing shell and oil ring; then the bottom bearing shell rolls out for easy inspection.



Special ball and socket type locator joints simplify removal and replacement of stator. In reassembly, perfect realignment is automatic.

Introducing a

Write today:

Ask for free copy of Catalog No. 2024A

NEW LINE of

STEELWELD HYDRAULIC PRESS BRAKES

Capacities to 2000 Tons

- **Positive overload protection.**
- **Constant power during entire stroke.**
- **Ram reversible at any point.**
- **Stroke quickly adjusted for any length.**
- **Fast ram approach and return—slow-speed pressing.**
- **Operating pressure simply adjusted.**
- **Accurate ram level automatically maintained.**
- **Ram easily tapered.**
- **Simple, safe to operate.**

CLEVELAND CRANE is proud to present its completely new series of Steelweld Hydraulic Press Brakes for bending mild steel from 10 gauge to 2 inches and in lengths to 30 feet.

Heavily built and of finest quality throughout, the machines are of the most advanced design with all features found desirable for ease of operation, maximum production and outstanding performance.

Steelweld hydraulically operated brakes are versatile machines capable of handling a wide variety of operations. They are ideal for jobbing shops, as well as for mass-production work. They work to close tolerances and have ample speed.

The new line of hydraulic brakes supplements the Steelweld line of mechanical press brakes, which Cleveland Crane has been building for more than 25 years, but does not supplant it. Each type of machine has its advantages and careful consideration must be given to the specific application to determine the type and size machine most suitable.

We urge you to get the facts on these new machines that have so much to offer you. Our sales engineers will be glad to give you the details. Or write for our new catalog below.

STEELWELD PRESSES

THE CLEVELAND CRANE & ENGINEERING CO.

3269 EAST 281 STREET, WICKLIFFE, OHIO

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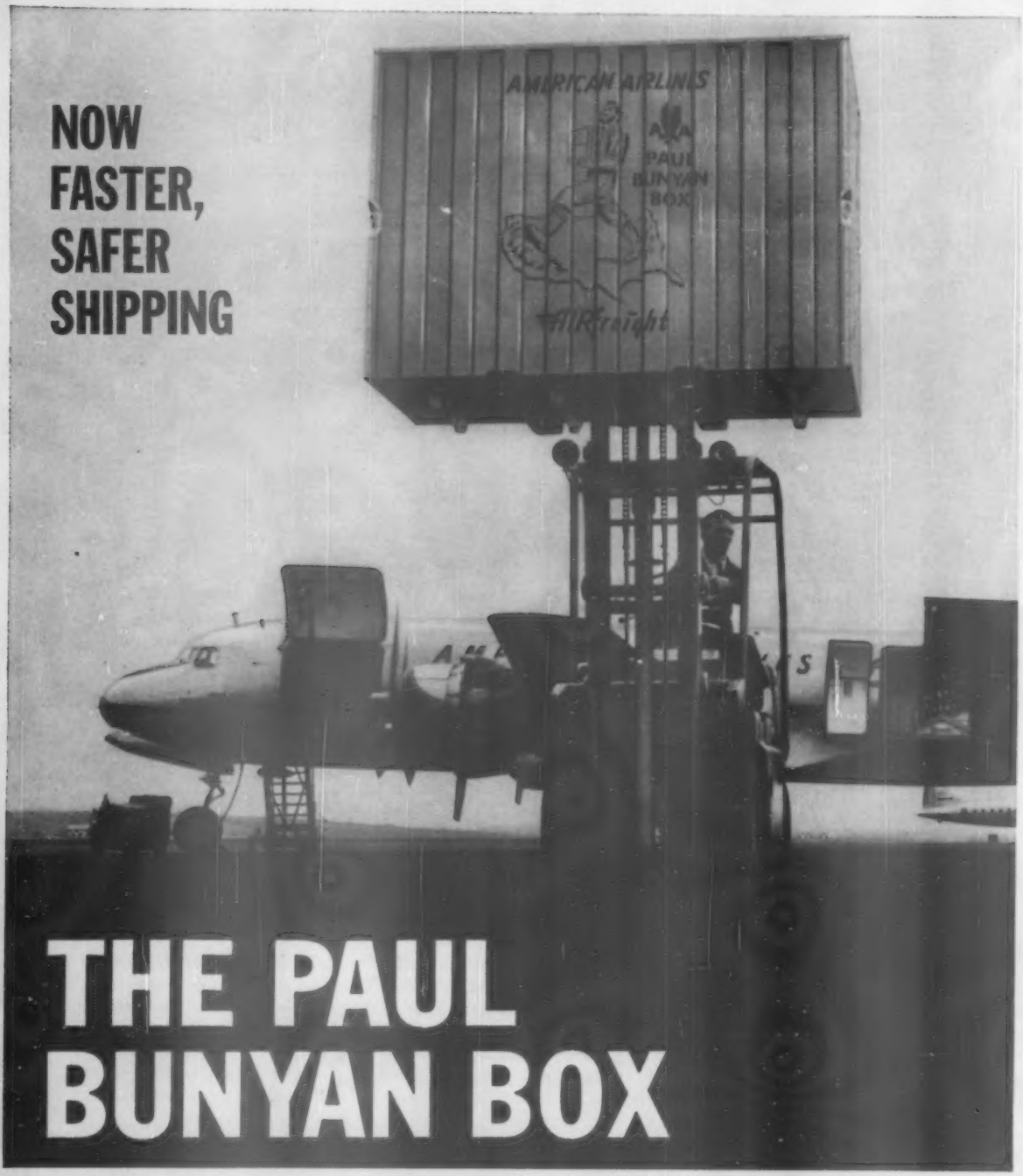

Now another "first" from American Airlines that means better service—the Paul Bunyan Box! Conceived by American and manufactured for American by Grumman, the Paul Bunyan Box (84″ x 46″ x 62″) is all aluminum with wheels and full length hatch. It's *safer*—offering far greater protection from damage, pilferage and weather. It's *faster*—speeding airport handling and aircraft loading. For information, call your nearest American Airlines Airfreight office.

AMERICAN AIRLINES AIRFREIGHT

America's Leading Airline

People buy Scott Towels for many reasons:

Mr. Byron E. Horn, Purchasing Director of Munsingwear, Inc., says:

"Scott towels cut costs and give Munsingwear employees the soft, clean, efficient drying they like!"

Most of the employees at Munsingwear, Inc., Minneapolis, are women . . . and they appreciate the *softness* and *cleanliness* of Scott Towels. Men working in the machine shop, printing and shipping departments like the drying *efficiency* of Scott Towels—because these men get their hands much dirtier, use towels frequently. Roll type cloth towels were expensive, had to be replaced often, weren't always as fresh and clean as employees like towels to be. Says Mr. Horn: "With Scott Towels we're saving money—but the most important thing is that our employees like them. Here, the emphasis is always on *people*, and we feel that in providing Scott products management is providing employees with the finest!"

SCOTT PAPER

Your Scott distributor is always nearby, with complete stocks and ideas on cutting costs. He's listed in the Yellow Pages under "Paper Towels." (And watch "Father Knows Best" on CBS-TV.)

Scott UHA Towels **Scott Multifold Towels** **Scott Singlefold Towels** **ScotTissue**

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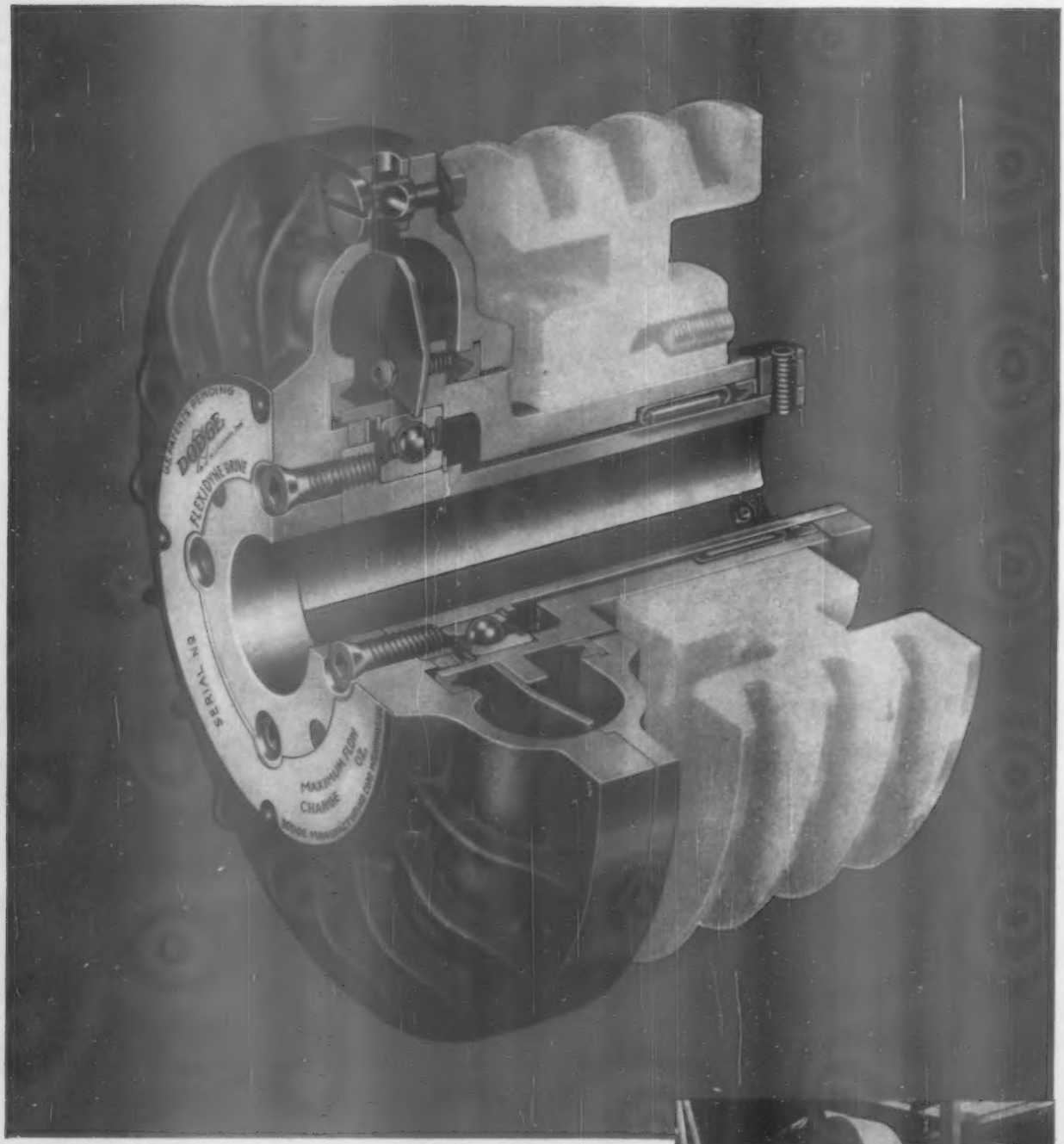
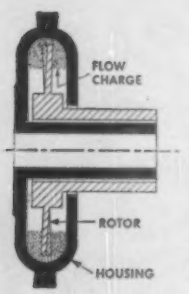




HOW FLEXIDYNE WORKS

The "dry fluid" in Flexidyne is tiny heat-treated steel shot. A measured amount, called the "flow charge," is contained in the housing, which is keyed to the motor shaft. Inside the housing is a rotor, free to revolve relative to the housing, but connected to the load.

When the motor is started, centrifugal force throws the flow charge to the perimeter of the housing, packing it between the housing and the rotor, which transmits power to the load. Initial slippage is momentary. Housing and rotor become locked together and achieve full load speed without slip and at 100% efficiency.

Overloads on a 150 hp jaw crusher cause sudden damage. Here Flexidyne is used to minimize this costly trouble. As a bonus, it reduces belt wear and replacement.

FLEXIDYNE

THE DRY FLUID DRIVE

OFFERS A NEW APPROACH TO DIFFICULT DRIVE PROBLEMS...OPENS THE WAY TO MULTIPLE SAVINGS!

IT IS NO LONGER NECESSARY to accept the destructiveness—the costliness—of conventional starting in the mechanical transmission of power! Flexidyne changes that.

LOOK AT YOUR DRIVES! Are you using expensive oversize or high torque motors merely to get your loads started? Are you using expensive starting equipment? Are you tolerating high demand rate? Are your belt maintenance costs high, because of the shock of across-the-line starting?

HOW ABOUT THE MATERIAL YOU PROCESS—wire, paper, textiles? Is your output hampered by breakages that you accept as "normal production"? Do you burn up clutches in getting your loads up to speed?

FLEXIDYNE—THE DRY-FLUID DRIVE—solves these problems—and many more! Flexidyne is revolutionary. *And so simple!* Off the shelf availability. Drives or Couplings. Fractional to 1000 hp. Ask your local Dodge Distributor or write us for technical Bulletin.

DODGE MANUFACTURING CORPORATION, 400 Union St., Mishawaka, Ind.

CALL THE TRANSMISSIONEER—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

DODGE
of Mishawaka, Ind.

Flexidyne, accurately set for extra gentle starting, solves the problem of thread breakage on this textile beam warper—vastly multiplying productivity.

Smooth starting and deft spotting are required with this 20-ton crane. Flexidyne accomplishes both—and by so doing saved $4,000 in electric controls!

A ball mill drive is a tough one. Flexidyne not only eases heavy starting shocks here but eliminates the necessity *and the cost* of an oversize motor!

For more facts circle 474 on Reader Servic Card

Now, for the first time,
sanding that's really

DUSTLESS

NEW BLACK & DECKER

vacuums dust for faster

You get unique vacuum hook-up!

Many outstanding features!

Top sanding of most materials!

Imagine sanding glass, plastic, metals, wood without particles of dust flying in all directions! The new Black & Decker 3″ Heavy-Duty *Dustless* Belt Sander picks up dust from your

PERFECT, EASY CONTROL of new B&D H.D. Belt Sander results from this palm-fitting knob positioned to give you complete command over path of sanding at all times.

QUICK BELT CHANGING: Just flip the lever, slide old belt off... new belt on. With B&D's exclusive dustless operation, belts last longer as belt clogging particles whisk away!

GREASELESS, SPOTLESS WORK: Exclusive B&D gearless transmission requires no lubrication, hence there's no grease or oil to spot working surface!

GETS INTO TIGHT SPOTS: Flush side permits working against verticle surfaces. Exposed front belt pulley lets you work on curved surfaces and small radii.

H.D. BELT SANDER

work . . . longer belt life!

work as fast as it is formed—whisks away belt-clogging particles. You'll like how much more work you can do . . . the finer finish you'll get . . . because your sanding belts are kept clean and sharp. Check the features at left, then mail coupon for a free demonstration. Once you've seen it in operation you'll want it for your production or maintenance!

Look Under "TOOLS-ELECTRIC" in Yellow Pages

Leading Distributors Everywhere Sell

Black & Decker®

Quality Electric Tools . . . Power-built to set the pace

For more facts circle 475 on Reader Service Card

MAIL TODAY FOR FREE DEMONSTRATION

THE BLACK & DECKER MFG. CO., Dept. 0709, Towson 4, Md.
(In Canada: Brockville, Ontario)

☐ Arrange a free demonstration of your new Belt Sander.

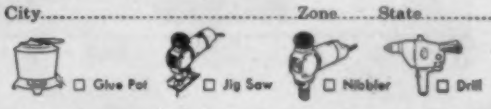
☐ Send me more information.

Name..... Title.....

Company.....

Address.....

City..... Zone..... State.....



No need to reseal every few years . . .

SEALANTS BASED ON LAST MUCH

Modern elastomeric sealants based on THIOKOL liquid polymers are reducing remedial costs. Structures stay sealed for years and years (probably for the life of the building)— despite the most unfavorable weather conditions. The result is low, low maintenance costs . . . because elastomeric-type sealants eliminate the need for constant resealing.

Elastomeric sealants are not just *improved* sealing compounds; they are an entirely *new type* of sealant—a sealant with a synthetic rubber base which provides truly remarkable resistance to heat, cold, wind, chemicals, and other hazards which cause conventional caulking compounds to deteriorate quickly.

It is no wonder, then, that many architects specify only THIOKOL liquid polymer-based sealants when planning the construction of today's most modern buildings.

No shrinkage from freezing temperatures . . . no bleeding from scorching sun!

Elastomeric-type sealants are virtually unaffected by severe temperature extremes which usually deteriorate ordinary sealing compounds. Year in, year out, these modern sealants maintain a firm, yet flexible seal—with no softening or bleeding during summer, and no cracking or shrinking during winter. In fact, whether the thermometer reads 200° *above* zero or 100° *below* zero, you can always depend on THIOKOL liquid polymer-based sealants to hold joints tight, allowing no leakage.

Thiokol® LIQUID POLYMERS LONGER . . . SHARPLY REDUCE MAINTENANCE COSTS!

Extremely resistant to deterioration by rain, ozone, oils and solvents

The continuous beating of wind and rain has no serious effect on joints sealed with THIOKOL liquid polymer-based sealants. During simulated hurricane storms (125 mph winds, and 12 inch per hour rains) these sealants adhere perfectly with absolutely no weakening of the seal. They also withstand the jarring impact of excessive vibration caused by subways or heavy vehicular traffic. In addition, elastomeric-type sealants are totally resistant to the damaging effects of oils, gases, solvents and chemicals.

Easy to apply to most building materials . . . masonry, wood, glass and metal

One of the most important features of the THIOKOL type elastomeric sealants is that they adhere to most building materials — making them suitable for a wide variety of uses. These sealants consist of a two-package system — a base material and a curing agent which is added just before use. The sealants convert to flexible rubber seals at ambient temperatures.

Thiokol®

CHEMICAL CORPORATION

780 NORTH CLINTON AVE. • TRENTON 7, NEW JERSEY

In Canada: Naugatuck Chemicals Division, Dominion Rubber Co., Elmira, Ontario

®Registered trademark of the Thiokol Chemical Corporation for its liquid polymers, rocket propellants, plasticizers and other chemical products.

FOR MORE INFORMATION:

Mail coupon to Dept. 43, Thiokol Chemical Corp., 780 N. Clinton Ave., Trenton 7, N. J.

Gentlemen: Please send me the new manual telling the complete story on THIOKOL polysulphide type elastomeric sealants.

Firm_____

Street_____

City_____ State_____

Your Name_____

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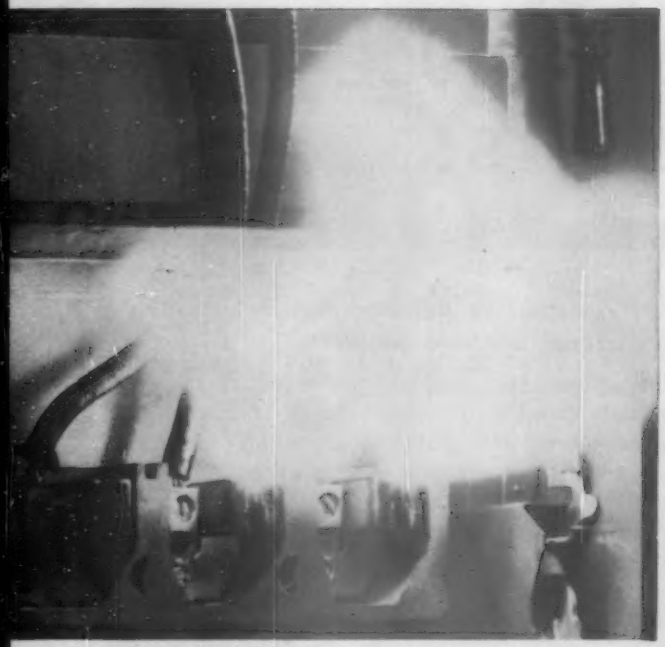
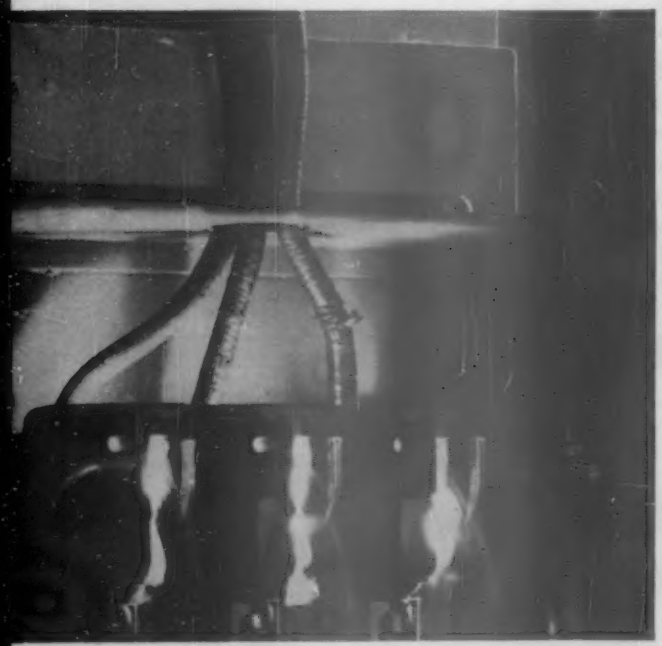
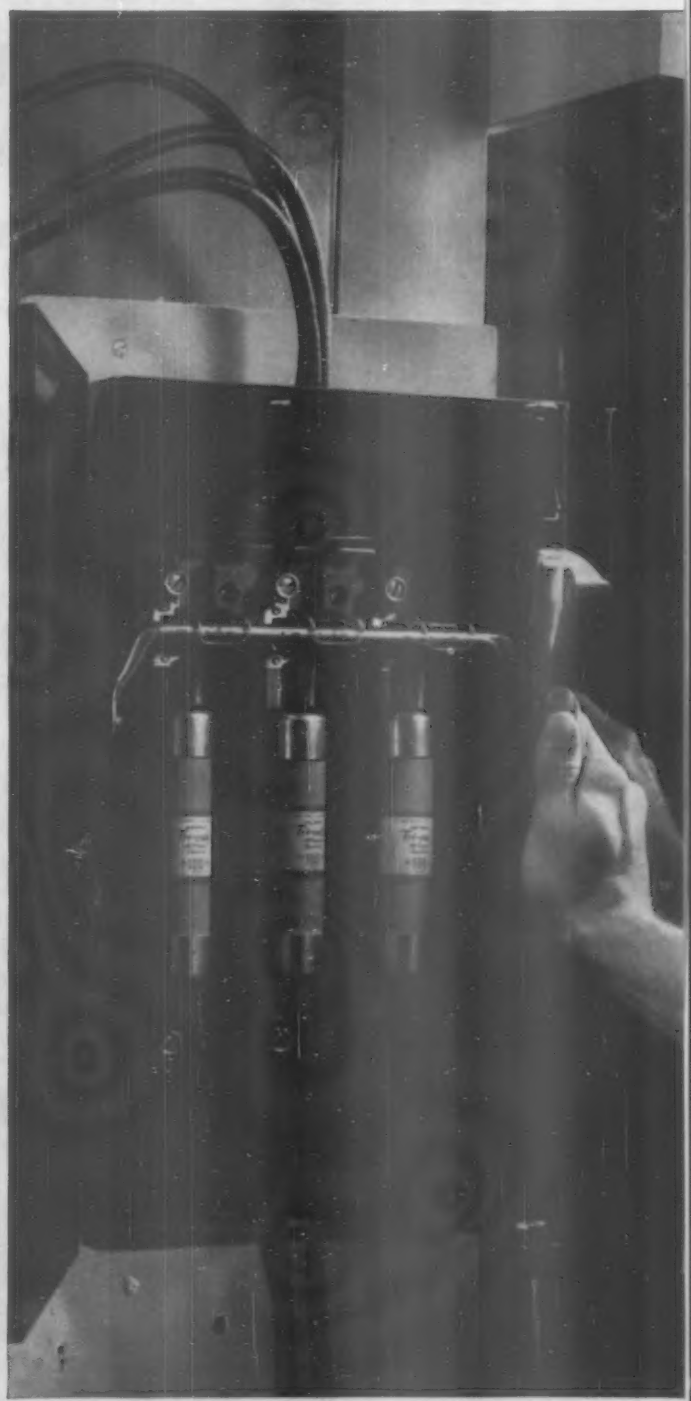
FOR SAFETY'S SAKE:



1. RUINOUS ARC in open knifeblade switch. At moment of "break" a flash explosion occurs. Blades pit, burn, deteriorate. Danger of fire is ever-present in open blade switches.



2. SUBDUED ARC in modified knifeblade switch. Closures or "quenchers" retard arcing slightly, but since blades must ultimately be pulled clear of closures the hazards still exist.



3. MAXIMUM SAFETY found only in BullDog Vacu-Break* Safety Switches. Arcing is confined inside compact Vacu-Break chambers. Arcs are snuffed out before they can cause any serious damage.

Unretouched photographs of the arc in 100-amp 600-volt switches operating under 90-amp 440-volt load with 40% to 50% power factor. All pictures taken at exact instant of "break".

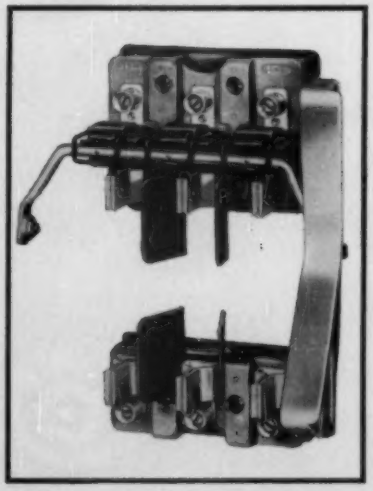
Let's take a good, long look at safety in today's safety switches

THERE'S A BIG DIFFERENCE in safety switches—a difference between maximum safety and half-way safety . . . low maintenance and excessive maintenance. These differences are quickly apparent when you compare BullDog Vacu-Break® Safety Switches with the other main type—the open knifeblade switch.

BULLDOG discarded the knifeblade design twenty years ago when they engineered the Vacu-Break. It is based on the engineering principle that an arc is the least destructive or dangerous if confined in an arc chamber which limits the oxygen supply . . . actually starves the arc before it can build up. "Explosions" are non-existent . . . the need for maintenance of contact points is virtually eliminated. Today, only BullDog has the Vacu-Break or anything like it. And it is available at no extra cost on both the Master and Junior types.

OPERATION of the Vacu-Break is simple, sure and safe. A sturdy rod attached to the operating handle is clamped directly to the Vacu-Break heads. When the handle is pushed "Off", this rod literally yanks the heads away from the stationary contacts. *Double "break" action is quick, foolproof.* Unlike knifeblade types, you need not depend on tricky spring and trigger mechanisms. You don't have to open the switch cover and check to see that contact has been broken!

100,000 AMP TEST. BullDog Vacu-Break Safety Switches, when used with current-limiting type Amp-traps**, will withstand the most severe fault currents. In recent tests standard BullDog switches with Amp-traps have been subjected to a 100,000 amp short circuit current. *The switches were undamaged!*

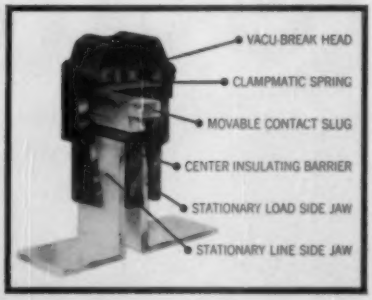


Vacu-Break heads are connected directly to the switch handle. No toggles or triggers, no tricky springs . . . no danger of switching failure. One of several exclusive BullDog Vacu-Break features that set the performance standards for the industry.

THE CLAMPMATIC ASSEMBLY (see the illustration below) is another safety feature of BullDog Vacu-Break Safety Switches. It gives bolt-tight contact in the "On" position, helps accelerate "break" when the switch is pushed "Off".

VALUE. You pay no more for Vacu-Break Safety Switches . . . yet you get the maximum in safety and full-time performance. *Compare*—and you'll buy BullDog. See your electrical distributor, contractor, or call a BullDog field engineer.

© BEPCO



Close-up of Vacu-Break head shows movable contact slug inside the compact, oxygen-limiting chamber. Clampmatic assembly assures bolt-tight contact, speeds "break". This combination guarantees positive, safe operation, long switch life.

BULLDOG

BullDog Electric Products Company, Division of I-T-E Circuit Breaker Company, Detroit 32, Mich. *BullDog Export Division:* 13 East 40th St., New York 16, N.Y. *In Canada:* BullDog Electric Products Co. (Canada) Ltd., 80 Clayson Rd., Toronto 15, Ont.

* *Vacu-Break and Clampmatic are registered trademarks of the BullDog Electric Products Company.*

** *Amp-Trap is a registered trademark of the Chase-Shawmut Company.*

For more facts circle 477 on Reader Service Card

How a Johns-Manville Roof Survey helps . . .

STOP COSTLY ROOFING TROUBLES

Don't take your roof for granted, even though it doesn't seem to be leaking. Winter weather often opens up laps in the roofing, cracks the parapet and coping. Ice and snow can wear and weaken roofing felts and flashings.

To correct roofing defects before they result in costly damage, it pays to have your roof inspected every spring by an expert. Your J-M Roofing Contractor is the man to do it. He will make a complete survey covering all critical areas of the roof. This includes flashings, deck, roofing felts, parapet walls, skylights, ventilators, etc.

This detailed survey is made without obligation. A written report will tell you what defects need immediate attention. This report also points out conditions which should be corrected now to eliminate future trouble.

For free Roof Survey, call your J-M Roofing Contractor. He is listed in the Classified Telephone Directory.

Send today for a copy of booklet "Things You Should Know About Your Roof." It contains information about the J-M Roof Survey Plan. Write: Johns-Manville, Box 158, New York 16, N. Y. In Canada, write 565 Lakeshore Road East, Port Credit, Ont.

JOHNS-MANVILLE

JOHNS-MANVILLE PRODUCTS

For more facts circle 478 on Reader Service Card

LINK-BELT Trolley Conveyors...

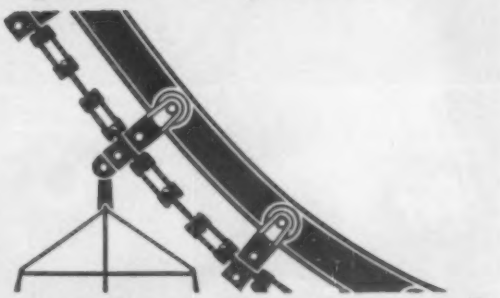
THROUGH PROCESSING AND INSPECTION, bathroom fixtures take a trolley ride on this Link-Belt conveyor at Briggs Manufacturing Co., Warren, Michigan.

link scattered processes in straight-line sequence

IF you are losing production hours because of delays in the transfer of materials between operations, you stand to profit significantly with a Link-Belt trolley conveyor system. Like a suspended superhighway, it connects wide-spread plant areas . . . assures a continuous flow of material.

Whether you handle eggs or auto frames, a Link-Belt trolley conveyor can meet any challenge your product or plant layout may offer. It can hug the ceiling to leave floor areas clear and clean . . . dive down to work stations . . . connect floors or buildings. And it permits storage, processing and assembly en route.

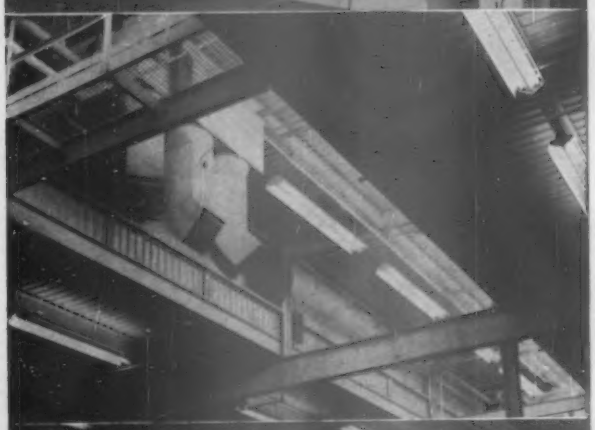
Having a close association with the development of trolley conveyors and with the experience of hundreds of installations, Link-Belt has undoubtedly overcome problems much like yours. Call your nearby Link-Belt office today for consultation. Or write for Book 2330.



LINK-BELT

TROLLEY CONVEYORS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,750



At top left is one of many "Buffalo" Central Station Air Conditioning Cabinets installed in Adhesive Plaster Mill of new Johnson & Johnson plant. These versatile units can be used for cooling and dehumidifying, heating and humidifying and/or air cleaning.

Second photo shows vertically suspended down-flow "Buffalo" Lowboy Heating Units used in Shipping Center. Ideal for heating large floor areas, these quiet, highly efficient units conserve valuable storage or production space.

At extreme upper left of third photo is a quiet, compact, efficient "Buffalo" Type "NV" Propeller Fan installation in Baby Products Plant. These economical "package" units for either direct or V-belt drive are shipped completely assembled, ready for quick, easy installation. At upper center and right of photo are two more "Buffalo" suspended Lowboy Heating Units, described above.

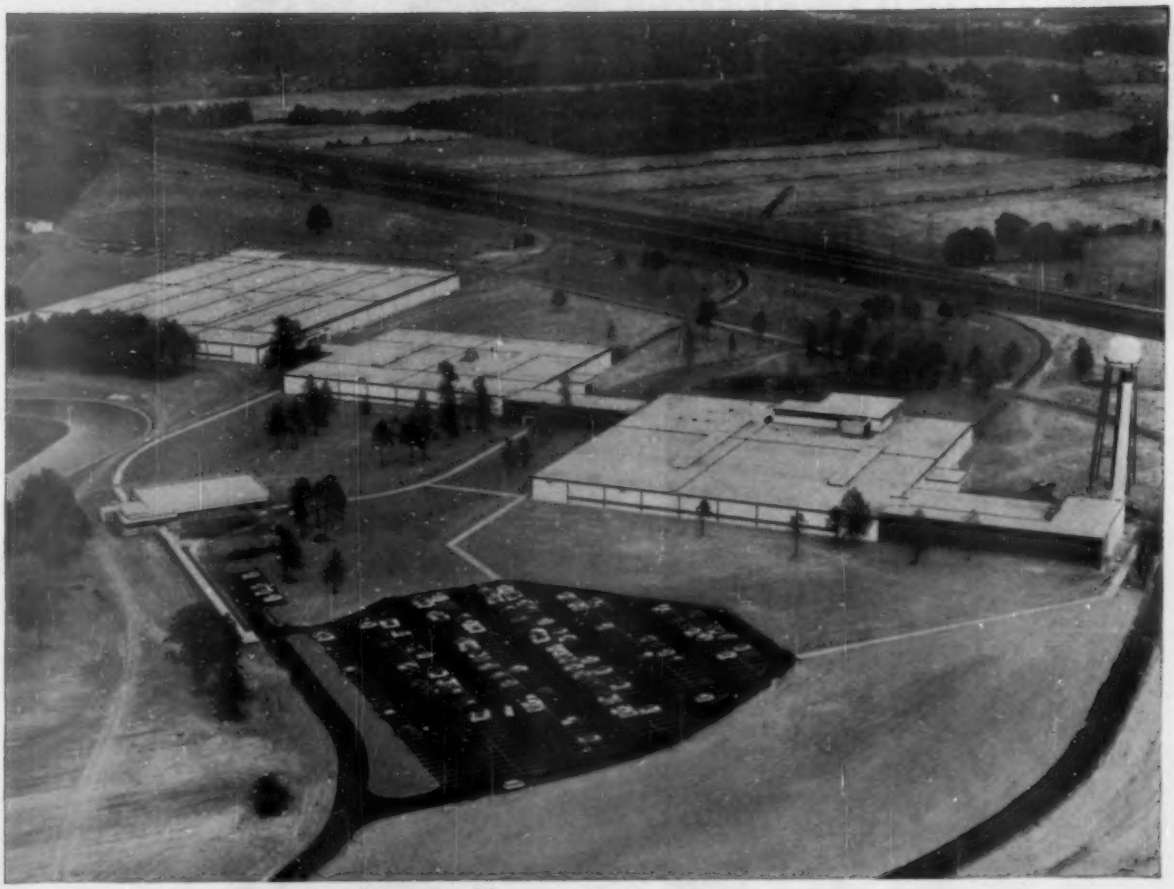
At lower left is one of the numerous "Buffalo" Breezo-Fin Unit Heaters installed in Shipping Center. The heater element is a one-piece copper tube with square copper fins, spaced to give maximum radiation. There is no possibility of inside leakage. The motor mount is welded one-piece construction.

COMPLEX PLANT HEATING

The sheer statistics of this new Johnson & Johnson plant are impressive. Located on a 300 acre tract, its 635,000 sq. ft. of floor space extend for nearly half a mile. It uses more than 1,000,000 watts of lighting, sufficient for a community of more than 900 homes. The complexity of its heating and ventilating system is indicated by the fact that it utilizes over 26 miles of piping.

"Buffalo" equipment was specified for this complex heating and air conditioning job for many important reasons:

> First, the high quality of the equipment itself . . . the "Buffalo" reputation for dependability, efficiency, advance-design, economy of operation down through the years.



Johnson & Johnson's Newest: World's Largest Surgical Dressings Plant at North Brunswick, N. J.

Engineers and Builders: Walter Kidde Constructors, Inc.,
Mechanical Contractors: Richardson Engineering Co.,
Sheet Metal Contractors: Middlesex Sheet Metal Co., Inc.

& AIR CONDITIONING PROBLEM SOLVED BY "BUFFALO" EQUIPMENT

Second, the **completeness** of the "Buffalo" line of heating and ventilating equipment . . . the wide variety of types, models and capacities to fit every possible application need. In all, "Buffalo" products quietly and efficiently handle a total of 928,000 CFM and 53,167,000 BTU/HR in this ultra-modern plant.

Third, the "Buffalo" record of more than 81 years of engineering experience, combined with modern-as-tomorrow design.

These are the sound reasons why "Buffalo" equipment was specified for the new Johnson & Johnson plant. They add up to very sound reasons for **you** to specify "Buffalo" equipment. When you plan **your** next plant' heating and/or ventilating installation, be sure to call on "Buffalo". Contact your nearest "Buffalo" Engineering Representative, or write us direct for full information.

A Vital Component of Every "Buffalo" Product is the "Q" Factor — the Built-in QUALITY Which Provides Trouble-Free Satisfaction and Long Life.

BUFFALO FORGE COMPANY

471 Broadway • Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd. • Kitchener, Ont.

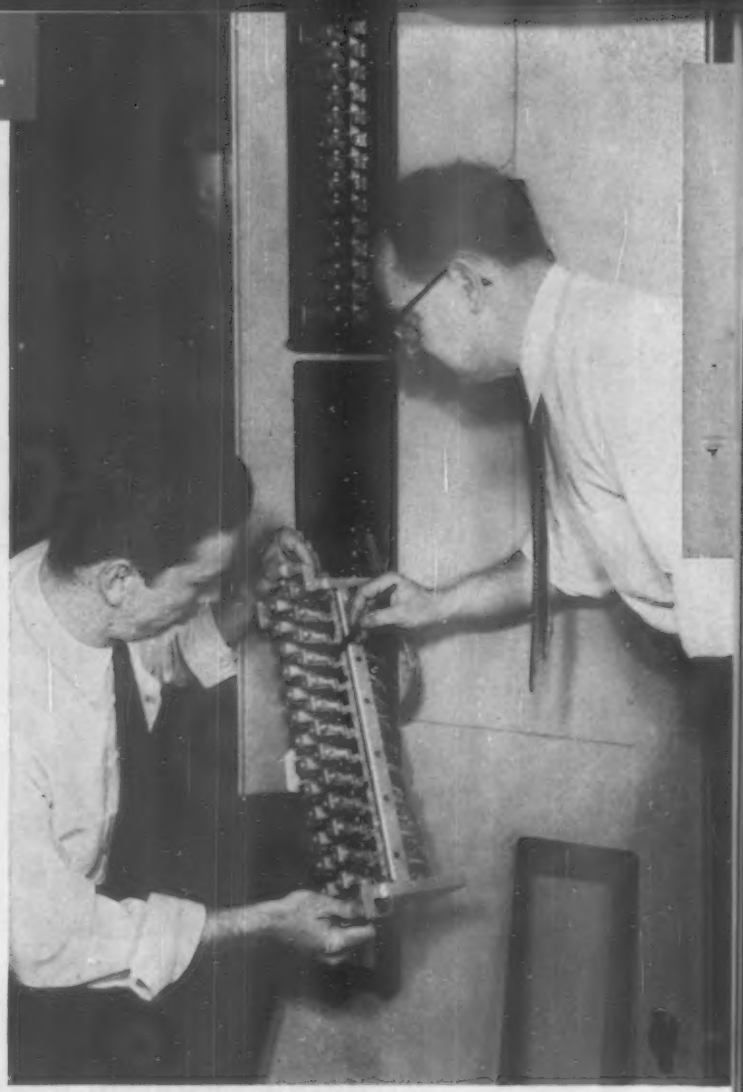
Sales Representatives in All Principal Cities

"Buffalo"

INDUSTRIAL EXHAUSTERS BELTED VENT SETS PROPELLER FANS "E" BLOWERS-EXHAUSTERS

SUPERVISORY CONTROL

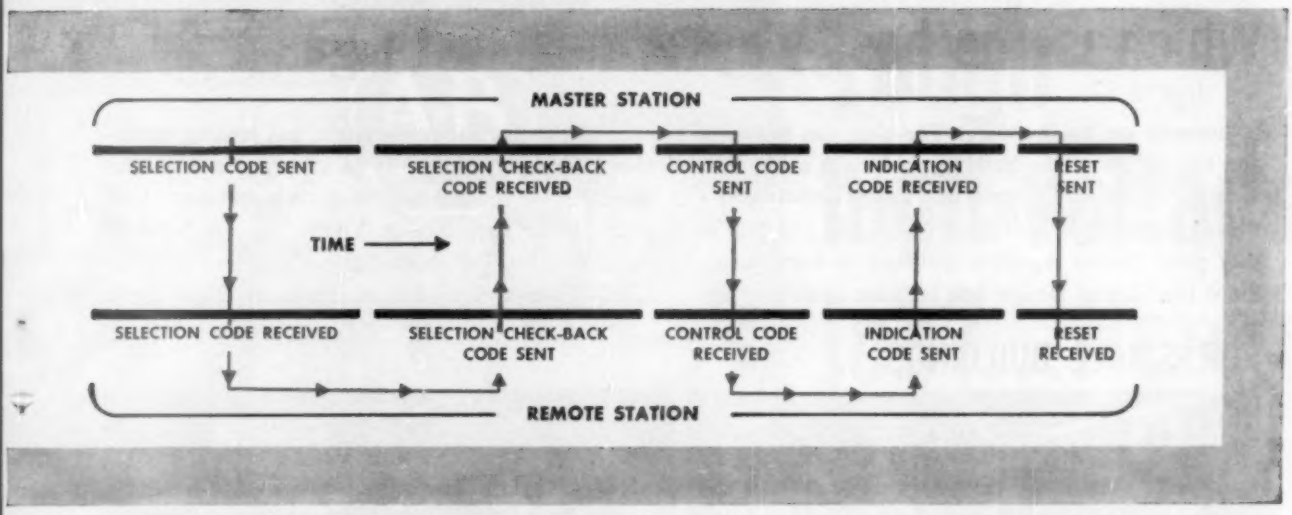
COMPLETE PICTURE of system conditions is available to operator at a glance with compact G-E Supervisory master station panels.



REMOTE STATION PANEL, located near controlled equipment, has telephone-type relays in easily removed drawout cases to facilitate maintenance, inspection.

MANY PHYSICAL ARRANGEMENTS of master station panels are available. This console-type panel, equipped with telemetering, controls pipeline.

WEATHERPROOF remote station is easily installed near controlled apparatus.



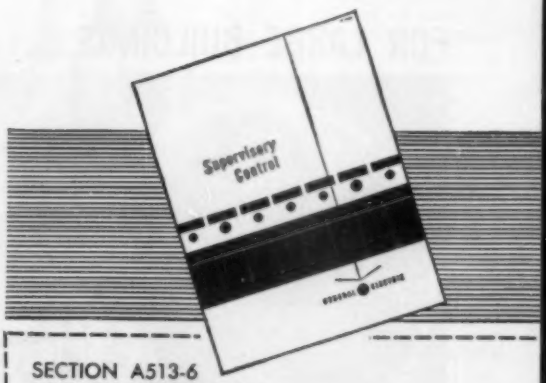
COMPLETE OPERATING SEQUENCE with G-E Supervisory takes less than three seconds from equipment selection to reset of system. Automatic check-back verifies selection. Only one communications channel is required for code transmission regardless of number of pieces of apparatus controlled.

You get proof of remote operation with automatic check-back feature of General Electric Supervisory Control

General Electric Supervisory Control operates any piece of remote apparatus which has provision for local electrical control. The system's automatic check-back confirms the selection operation, giving you added security in the control of your equipment.

Regardless of the number of pieces of apparatus controlled, supervisory equipment requires only one communications channel. The desired apparatus is first selected, then operated, from a compact master station panel. Selection and control are both verified before the equipment automatically resets. The operation sequence requires only three seconds, regardless of the point selected or the control distance.

G-E Supervisory Control utilizes a space-code selector system which practically eliminates misoperation caused by random interference. It has frequently proven itself more dependable than comparable, more costly direct-wire remote control systems. For information on how supervisory equipment can help solve your remote control problems, call your nearest General Electric Apparatus Sales Office, or mail the coupon at right.



Progress Is Our Most Important Product

GENERAL ELECTRIC

SECTION A513-6
GENERAL ELECTRIC CO.
SCHENECTADY, N. Y.

I'd like full details on the dependability of General Electric Supervisory Control Equipment. Please send me GEA-6603.

NAME _____

COMPANY _____

STREET _____

CITY _____ STATE _____

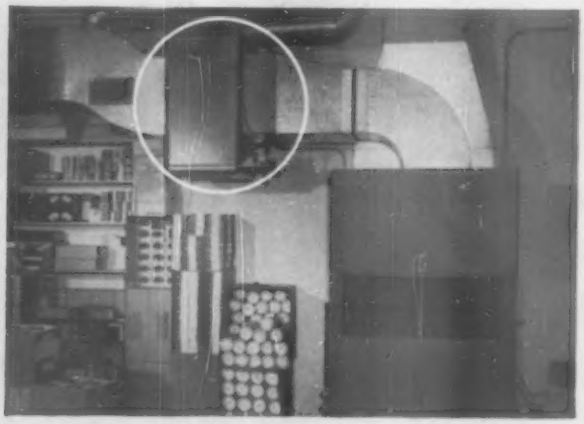
For more facts circle 481 on Reader Service Card

Which is the best way to heat with gas?

It depends on the building. The size, the purpose and the layout of the building can make a big difference. That's why Carrier offers such a wide selection of types and sizes of gas-fired heaters, and that's why your Carrier Agent is the man to work with. Since the Carrier Heater line includes almost every type of commercial or industrial gas heating equipment, his only interest is to supply you with the type that serves you best in your installation. Call your Carrier agent today. You'll find him listed in your Classified Telephone Directory under "Heaters-Unit." Carrier Corporation, Syracuse, New York.

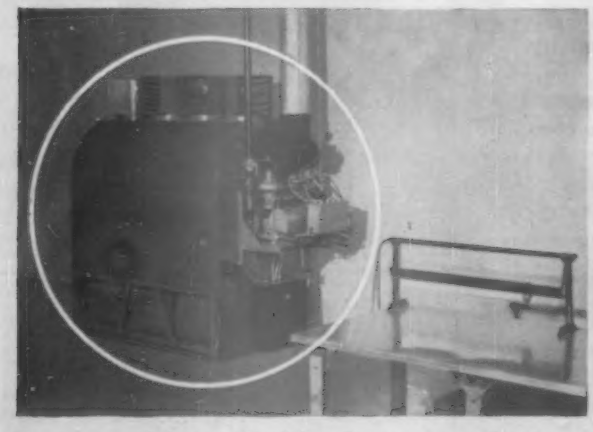
FOR SMALL BUILDINGS...

Used for heating only, independent Carrier Gas-fired Unit Heaters feature heat exchangers made of aluminized steel for years of dependable service. Compact, handsomely styled and finished in gray baked enamel. In sizes ranging from 50,000 to 230,000 Btu/hr input.

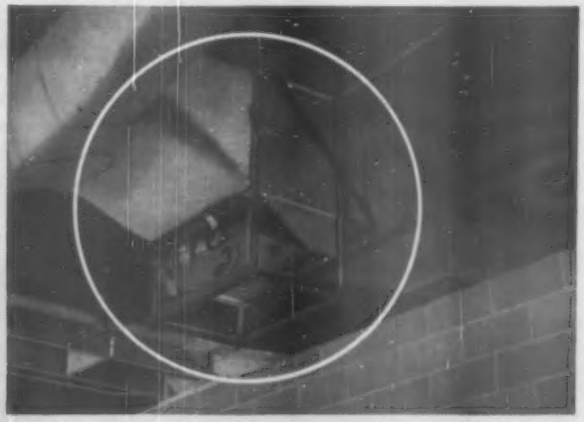


Used with air conditioning, new Carrier Duct Furnaces provide reliable heat at low cost. Now smaller in dimensions, these compact units fit in most areas too cramped for conventional units. Attractively styled. They are available in 8 sizes ranging from 50,000 to 230,000 Btu.

FOR LARGE BUILDINGS...



For a complete gas-fired heating system, choose a Carrier Heat Diffuser—Direct Fired. Factory assembled. Needs only gas and power connections. Can be used with outlets or duct work, gas alone or combination burners. 10 sizes, 300,000 to 2,000,000 Btu/hr output.



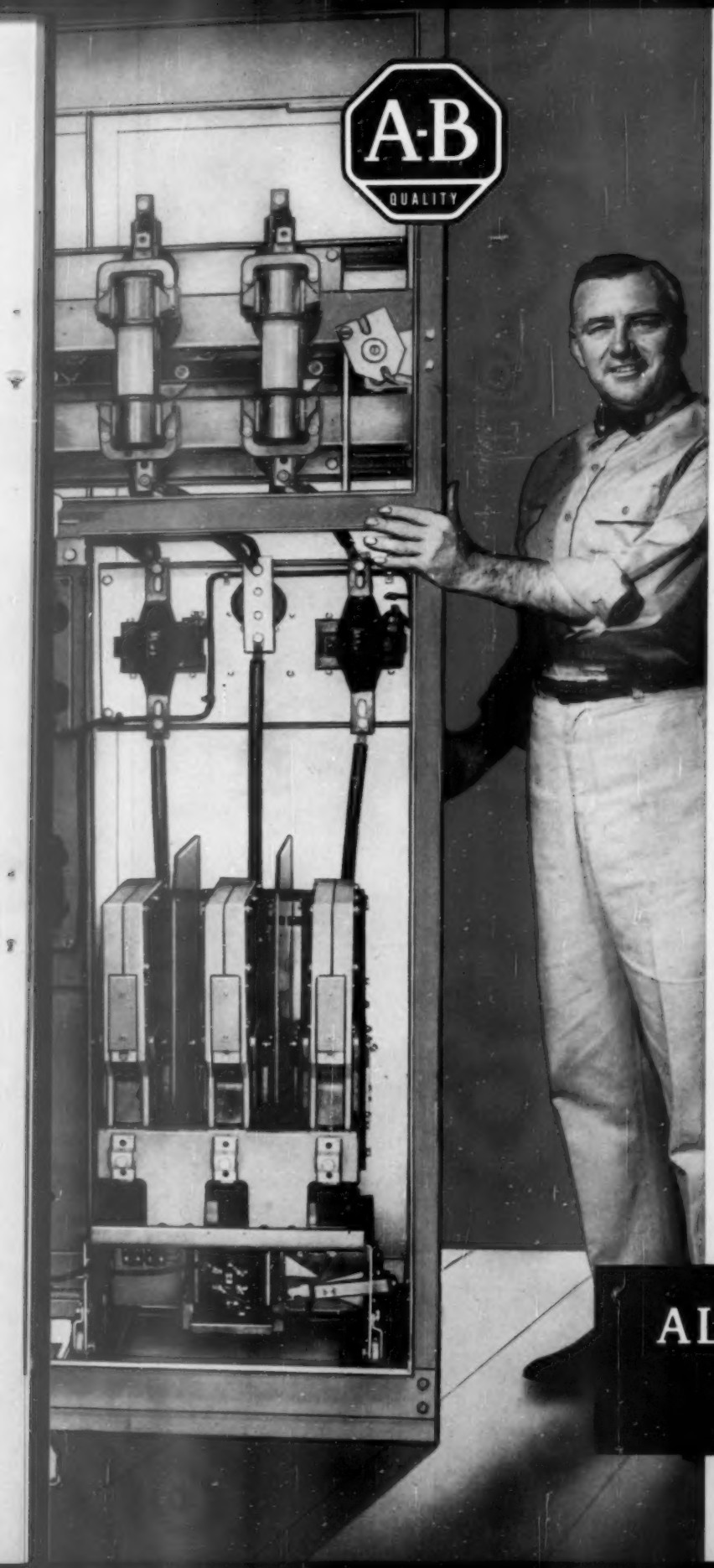
For use with a central air source, large Carrier Duct Furnaces may be floor mounted or suspended overhead. Aluminized heat exchanger. Flanged casing for easy duct connections. These furnaces may be used singly or in multiples to provide up to 1,760,000 Btu capacity.

Carrier

air conditioning
refrigeration
industrial heating

For more facts circle 482 on Reader Service Card

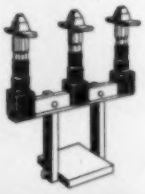
For more facts circle 483 on Reader Service Card ➤



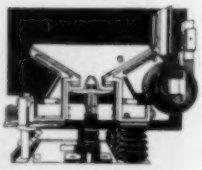
Tough high-voltage job?...Here's the answer!

Allen-Bradley High-Voltage Air Break Starters are ideal for frequent switching, reversing, plugging, or jogging.

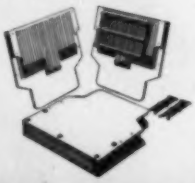
A tremendous operating life has been built into these high-voltage air break starters . . . resulting from the use of the simple solenoid contactor. It's the same design—having only ONE moving part—that provides millions of trouble free operations in Allen-Bradley's low-voltage controls. These starters are made in a complete line for all types of service. Send for Publication 6080, today.



ONLY ONE MOVING PART
With this simple solenoid design, all trouble causing pivots, pins, and flexible jumpers are eliminated. Straight up-and-down motion of contactor is virtually frictionless.



DOUBLE BREAK CONTACTS
Allen-Bradley silver alloy contacts never need maintenance . . . they remain in perfect operating condition until completely worn away. Vertical motion assures uniform contact pressures at all times.



FASTER ARC SUPPRESSION
The air break contactor employs a completely different blowout design and novel arc chute which assure rapid arc extinction. Chutes are molded from arc resistant material.

ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.
9-58-M

THE ONLY LINE OF

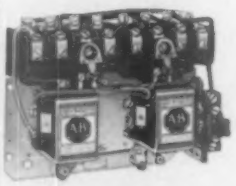
D. C.
MOTOR STARTERS
with modern
SOLENOID CONTACTORS

With Allen-Bradley, you get D. C. motor control that is *completely modern!* It uses the simplest switching mechanism yet conceived . . . the solenoid contactor with only ONE moving part. There are no bearings to stick . . . no jumpers to break. This assures millions of trouble free operations. And the double break, silver alloy contacts never need maintenance. Available in ratings up through Size 4. Write for details.

CONTACTORS

Bulletin 202 solenoid type contactor. In ratings to 150 amp. Also, clapper type to 600 amperes.

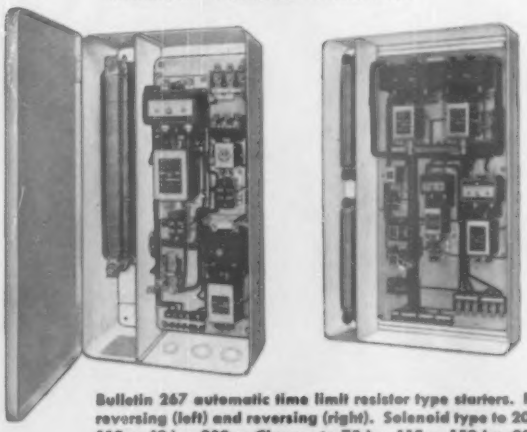
FULL VOLTAGE STARTERS



Bulletin 205 full voltage reversing starter. Ratings to 1½ hp, 115 v; 2 hp, 230 v.

Bulletin 209 full voltage starter. Available in ratings up to 1½ hp, 115 v; 2 hp, 230 v.

REDUCED VOLTAGE STARTERS



Bulletin 267 automatic time limit resistor type starters. Non-reversing (left) and reversing (right). Solenoid type to 20 hp, 115 v; 40 hp, 230 v. Clapper to 75 hp, 115 v; 150 hp, 230 v.

9-58-MR

ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

MAIN OFFICE and Factory
1316 S. Second St.
Milwaukee 4, Wis.

In Canada: Allen-Bradley Canada Ltd., Galt, Ontario

NOW! from Bausch & Lomb, an ALL-NEW Cup-Type GOGGLE LINE

NEW! A complete, improved line of chippers' and welders' goggles in regular and coverall types!

NEW size, new safety-comfort contours, new visibility!

NEW super-tough thermo plastic material for new strength, new durability in high-luster cool green finish!

NEW efficiency features, cleanliness features, new interchangeability!

NEW value: all these features at no increase in prices!

BAUSCH & LOMB

SINCE 1853

BAUSCH & LOMB OPTICAL CO.
90133 Smith St., Rochester 2, N. Y.

Please rush illustrated spec folder (A-1684) showing the all-new Cup Goggle Line.

NAME ..... TITLE .....

COMPANY .....

ADDRESS .....

.....

For more facts circle 484 on Reader Service Card

MOTOR-DRIVEN and HAND-OPERATED CRANES

HAND-OPERATED CRANES • To Fill a Wide Range of Applications up to 50 Tons

• WRIGHT's line of hand-operated cranes is also available to you for money-saving local assembly with WRIGHT End Trucks and Hoists, or as a complete unit from the factory. Whether you buy 'em or build 'em yourself, you'll find these cranes are made to machine tool accuracy, assuring you of a crane that's exact in span, true in alignment, and perfectly square throughout. Though only two models are shown below (B-9 and B-36), double bridge B-47 cranes are also available. Any of these cranes will give you an excellent stand-by installation which will permit accurate spotting of loads. They are offered in capacities of 1-ton to 50-tons, with spans up to 50 feet. WRIGHT cranes are conservatively engineered to be as safe or safer than any competitive crane for comparable service. All have a minimum 5-to-1 safety factor.

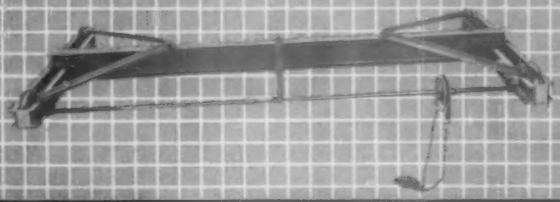
FEATURES OF WRIGHT HAND-OPERATED CRANES

End Trucks are of welded steel channel construction. Heavy channel diaphragms are jig-welded and bored to insure perfect alignment of axles, wheels and drive shaft. Squaring shaft is made of ground and polished steel, geared to end trucks for uniform travel of crane ends.

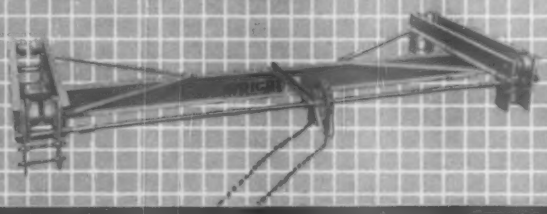
Timken Tapered Roller Bearings • Two opposed bearings on each truck wheel absorb the radial and thrust loads imposed by normal crane operation.

Hand Wheel is keyed to squaring shaft. Wheel operated by a pendent chain. Guide protects chain and at the same time prevents it from gagging or leaving wheel pockets.

B-9 TOP RUNNING SINGLE BRIDGE CRANE

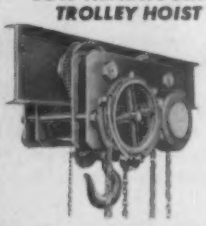


B-36 UNDERHUNG SINGLE BRIDGE CRANE



BUILD LOW-COST, HAND-OPERATED CRANES FROM THESE WRIGHT COMPONENTS

LOW HEADROOM TROLLEY HOIST



The Type 600 is a special-purpose hoist designed for situations where extra-close headroom is encountered. The trolley has Timken Tapered Roller Bearings and steel side plate construction. Available either plain or geared. Has capacity of 1½ to 24-tons.

B-9 END TRUCKS

For top running single bridge cranes. Precision-ground tapered tread double-flanged wheels are cast of special car wheel iron. Tread is deep-chilled to a hardness of 450-500 Brinell. Wheels automatically center and align themselves, keep crane from skewing.

WRIGHT ELECTRIC CHAIN HOISTS

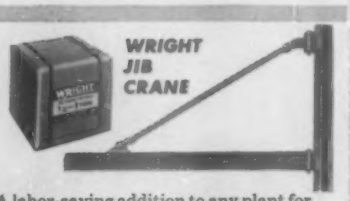
Has the fewest working parts of any power hoist available! Alloy load chain is wick-lubricated. Drop-forged alloy steel wheel, hooks, coupling. Ball bearings. Double braking system. Comes in two capacity ranges: Single Chain (300 to 2000 lbs.); Double Chain (3000 to 4000 lbs.)

ARMY-TYPE TROLLEY HOIST

Recommended for close headroom service using a WRIGHT Safeway hoist suspended from a load bar rigidly attached to a stiff side plate trolley. All wheels have chilled tread and run on two Timken Roller bearings. Fits wide range of beam sizes. In geared or plain.

B-36 END TRUCKS

For underhung single-bridge cranes. Can be adjusted for a variety of standard I beams, or specially made for wide-flange beams. Wheel treads chilled for long service. Two Timken Tapered Roller Bearings per wheel, mounted on stationary axles.



WRIGHT JIB CRANE

A labor-saving addition to any plant for supplementary use to a regular traveling crane or monorail track, or for use in bays, on the sides of the shop, etc. The hinge plates are fitted with Hyatt Roller bearings or bronze bushings. One complete set of fittings comes packaged in separate carton.

WRITE US FOR COMPLETE INFORMATION

Complete information about all these WRIGHT products is available by writing our York, Pa., office. For information on specific items listed below, please refer to booklet number.

DH-438 • B-669 Cranes
TWH Trolley Hoist
Underhung Trolley Hoist

DH-227 • B-516 Cranes
E-58 • 2-Motor Electric Hoist
DH-431C • Crane Drive Unit
DH-468A • B-9 Cranes

DH-455B • B-36 Cranes
DH-241B • Low Head-Room Hoist
DH-269D • Army-Type Hoist
DH-347A • B-9 End Trucks
DH-348C • B-36 End Trucks
DH-73A • Electric Chain Hoist
DH-300A • Jib Cranes

Buy 'em or Build 'em... WRIGHT

MOTOR-DRIVEN CRANES • 1-Ton to 25-Ton Capacities, Up to 55-ft. Spans

• Now, you can buy modern, efficient WRIGHT Motor-Driven Cranes two ways—factory-assembled as a complete unit or built locally from WRIGHT "matched" components. Shown below is a B-1514 top running double bridge crane and a B-516 underhung single bridge crane—just two of the many models of WRIGHT Motor-Driven Cranes. All can be built locally from end trucks, trolley hoists and crane drive units. All will save you money by drastically reducing freight charges. Instead of paying shipping costs on a complete unit, you pay only for the component parts and order heavy I-beam structurals locally. In addition, WRIGHT will furnish you with a detailed assembly diagram and a complete list of the structural components you'll need.

FEATURES OF WRIGHT MOTOR-DRIVEN CRANES

End Trucks of welded steel channel construction with heavy steel plate diaphragms. Squaring shaft of ground and polished steel—geared to both end trucks to assure uniform travel of the crane.

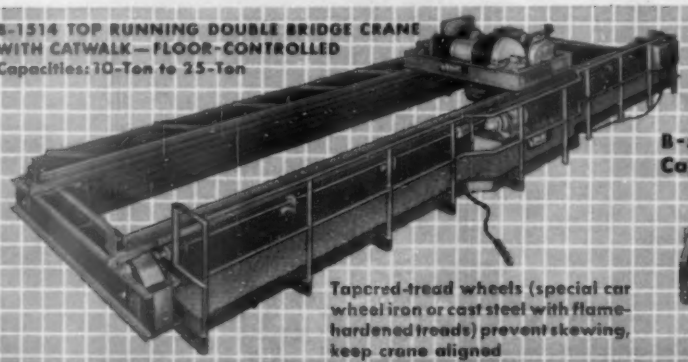
Timken Tapered Roller Bearings (two to each truck wheel). Placed in opposition to one another, these bearings compensate for both radial and thrust loads and will safely absorb shock treatment. Adjusting nut on wheel axle takes up bearing play with ease.

Ring Gear • Heat-treated steel. Teeth are 20° stub, involute form.

Full Integrated Electrical Controls for WRIGHT Cranes equipped with a WRIGHT Hoist and a WRIGHT Crane Drive Unit will be factory-installed at no extra cost if you assemble your own crane locally.

Controls • Single speed pushbutton control furnished with cranes equipped with fluid drive—two speed and variable speed pushbutton control on cranes without fluid drive. 6-button pendant—2 buttons each for crane travel, trolley motor and hoist motor.

B-1514 TOP RUNNING DOUBLE BRIDGE CRANE WITH CATWALK—FLOOR-CONTROLLED
Capacities: 10-Ton to 25-Ton



Tapered-tread wheels (special car wheel iron or cast steel with flame-hardened treads) prevent skewing, keep crane aligned

B-669 Top Running Double Bridge Crane and B-514 Top Running Single Bridge Crane can be furnished with cab control or floor control in a wide variety of speeds, lifts and types of control. These units are not shown

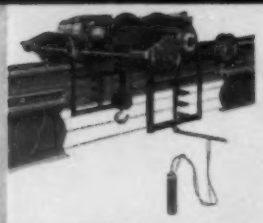
B-516 UNDERHUNG SINGLE BRIDGE CRANE
Capacities: 1-Ton to 10-Ton

Flangeless wheels run on beams with varying flange widths. Guide rollers keep crane properly aligned

ASSEMBLE YOUR OWN CRANE WITH STRUCTURALS AND COMPONENTS BOUGHT LOCALLY!

TROLLEY HOIST FOR B-1514 CRANES

Standard B-1514 cranes are equipped with a top running, double beam trolley hoist. This unit is either motor-driven or hand-geared.



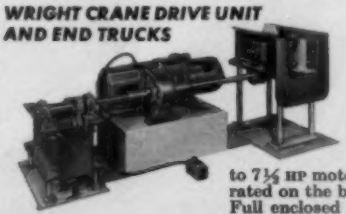
TWH 2-MOTOR TROLLEY HOIST FOR B-669 CRANES

This unit is either motor-driven or hand-geared, and includes a WRIGHT *Speedway* Electric hoist. The trolley is designed so that short or long drum hoists can be used with standard 5'-0" center bridge beams. Welded steel frame is carried on double flanged, chilled tread, car wheel iron wheels equipped with two Timken Tapered Roller Bearings. Upper, lower limit switch. 4, 6 or 8-button pendant.

WRIGHT TWO-MOTOR ELECTRIC HOIST

Recommended for use with the WRIGHT B-516 crane shown above, or the B-514 crane, not shown. Available in a capacity range of 4-ton to 10-ton. Unusually compact for close headroom. Features NEMA 30-minute motors exclusively, two-speed or variable speed controls. Heat-treated alloy steel gears, pinions. Ductile gear cores are shock-resistant. Anti-friction bearings. Weston load brake. Ingenious motor brake is cam-controlled... foolproof adjustment.

WRIGHT CRANE DRIVE UNIT AND END TRUCKS



This compact, adaptable drive unit, totally enclosed for outdoor service, consists of an electric motor and well proportioned gear reduction. Single speed motors drive through fluid coupling, which is optional with two speed or variable speed motors. Two frame sizes accommodate 2 to 7½ HP motors. All motors up to 5 HP are rated on the basis of 30-minute duty cycle. Full enclosed sealed ball bearings. Unit is shown driving standard underhung end truck on the right and top running end truck on the left.

In Canada: **UPTON, BRADEEN & JAMES LTD., Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Vancouver**

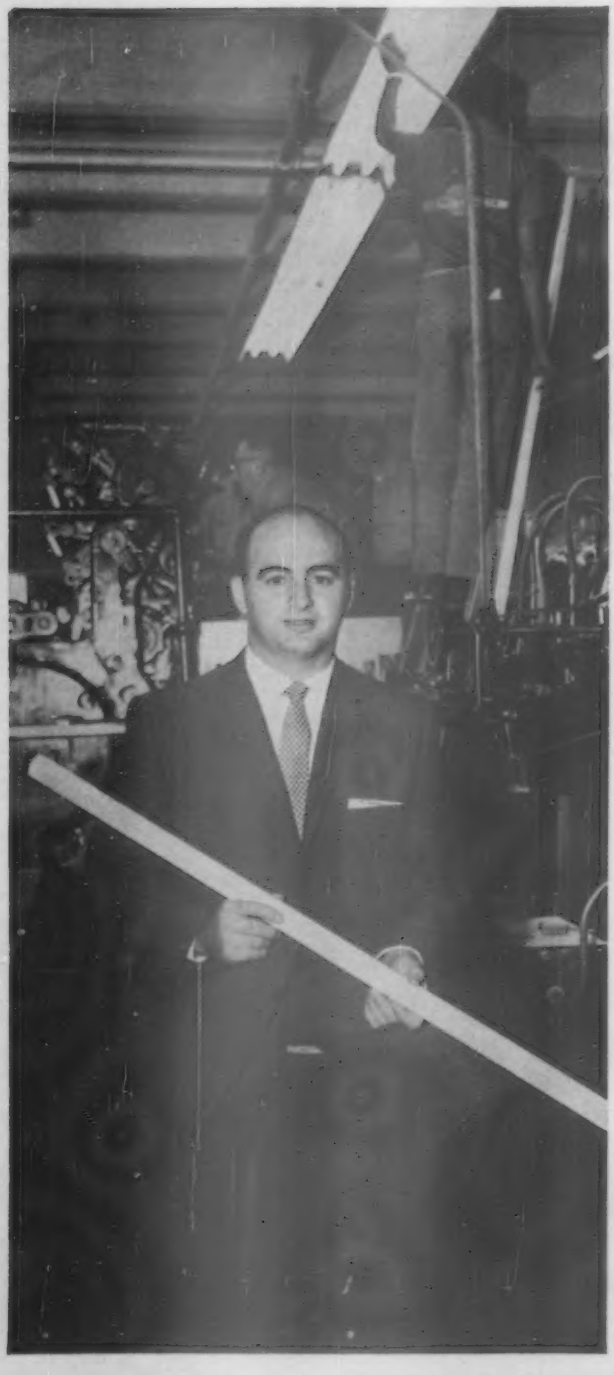
Wright Hoist Division
AMERICAN CHAIN & CABLE

ACCO

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

For more facts circle 485 on Reader Service Card

"We keep lighting maintenance costs down by using quality products...



that's why we use General Electric lamps"

"We're lighting maintenance contractors whose services include replacing burned out tubes, ballasts, starters — and the periodical cleaning of fixtures," says Herbert Mendelsohn of Sun Ray Lighting Company, Kansas City, Mo., "and we must keep our customers' lighting at peak operating efficiency quickly and economically.

"So, in effect, *we sell footcandles at the lowest possible price.* Naturally, we use the lamps that give more light for the current used, and are the most reliable. A defective tube causes an extra service call—as does an early burnout. So we use General Electric Lamps that last longer and have virtually no defects. This way our customers get better lighting—and we hold our costs down while improving our profit picture."

Whether you now buy your own lamps—or use a contract service such as Mr. Mendelsohn's, you can get more value for every dollar you spend on lighting by specifying General Electric Lamps. Call your nearby G-E Lamp Specialist and see for yourself. Or write: General Electric Co., Large Lamp Dept. C-840, Nela Park, Cleveland 12, Ohio.

OPERATION upturn

Progress Is Our Most Important Product

GENERAL ELECTRIC

G-E LAMPS GIVE YOU MORE VALUE FOR ALL YOUR LIGHTING COSTS

"Take a tip from me—

One slip can cost more than USS Multigrip"

USS* Multigrip Floor Plate is specifically designed to help protect you against accidents from slips and skids. It will pay you to examine your plant or shop for possible accident-prone areas that could be made safe with Multigrip.* For it provides traction for feet and wheels at all times—in all directions.

Where floor surfaces take a pounding, USS Multigrip supplies a rugged, long-lasting cover. It's made from heavy-duty plate that will last for years without maintenance. Studded with hundreds of risers in a symetrically designed pattern, their flat tops provide a greater bearing surface, reducing wear and prolonging the non-skid properties. Rugged though it is, it's comfortable to walk on and safe, wet or dry.

You save money on cleaning, too! A quick once-over with a broom or hose will get it spick and span. There are no pockets to hold dirt. Water drains quickly in any direction. Get USS Multigrip from our local distributor near you.

Sold by leading distributors from coast to coast

United States Steel Corporation – Pittsburgh
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United States Steel Supply – Warehouse Distributors
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*TRADEMARK

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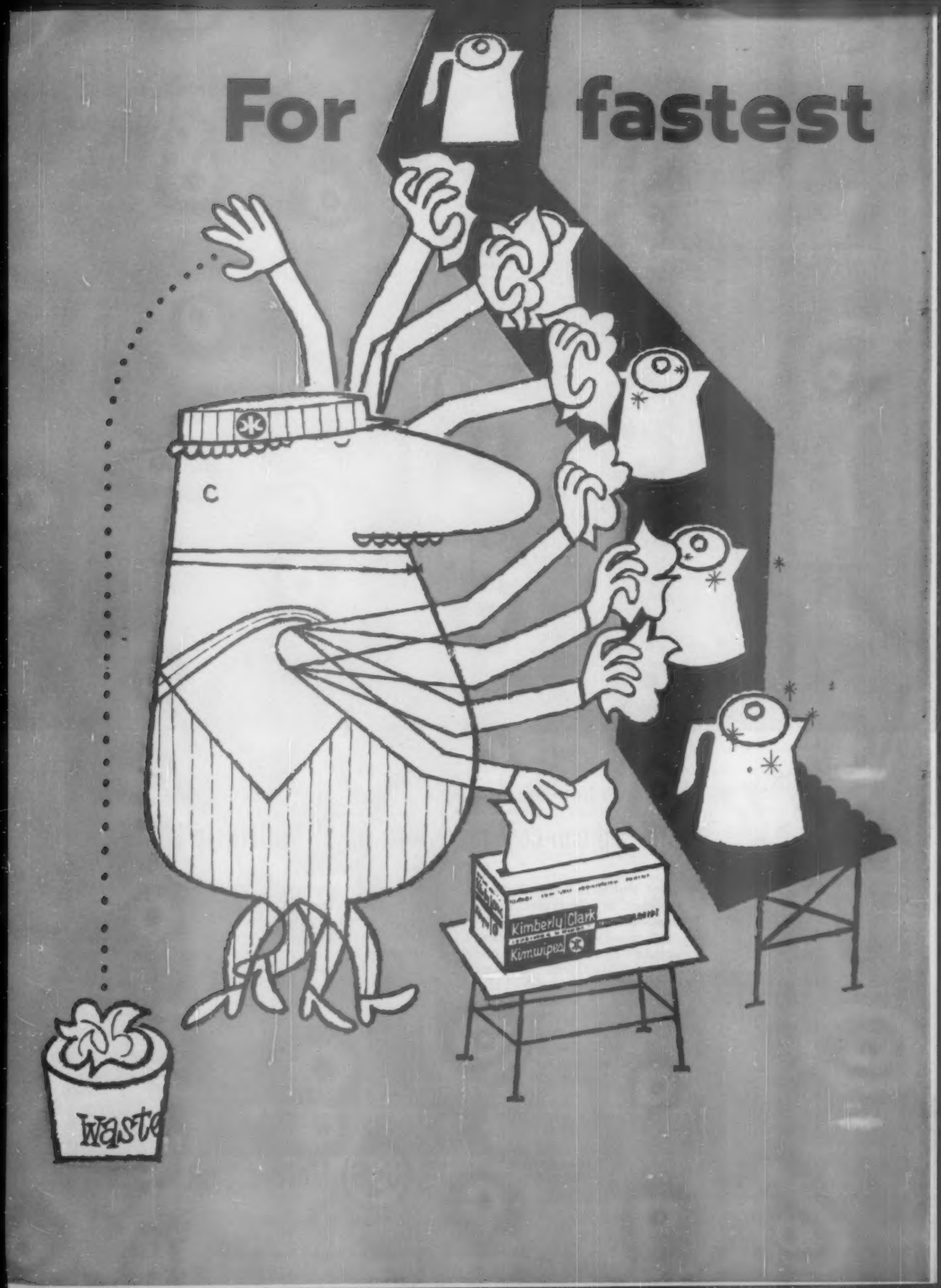
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Kimwipes Industrial Wipers wipe out laundry bills, rag collecting and pilferage. Find out how Kimwipes can save money, workers' time and cut production costs.

For positive proof of outstanding performance, ask to see the astonishing Comparison Demonstration that proves the superiority of Kimwipes Industrial Wipers. See in your own plant Kimwipes' excellent "pickup"... its conformability... its superior wet strength. And Kimwipes pop up like Kleenex tissues in handy cartons or wall dispensers.

Call your supplier today and ask him to show you the Kimwipes Comparison Demonstration, or request it when you send for the free Kimwipes offer below.

Use Kimwipes in handy cartons or wall dispensers for:

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Production lines General plant use Finishing operations Print shops

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KIMBERLY-CLARK CORPORATION, NEENAH, WISCONSIN

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So that you can try them and prove to yourself how Kimwipes will cut your production costs, we will send you absolutely free one regular size box of Kimwipes 1300's. Just send your name, firm name and address to Kimberly-Clark, Neenah, Wisconsin. Dept. FMM-98.

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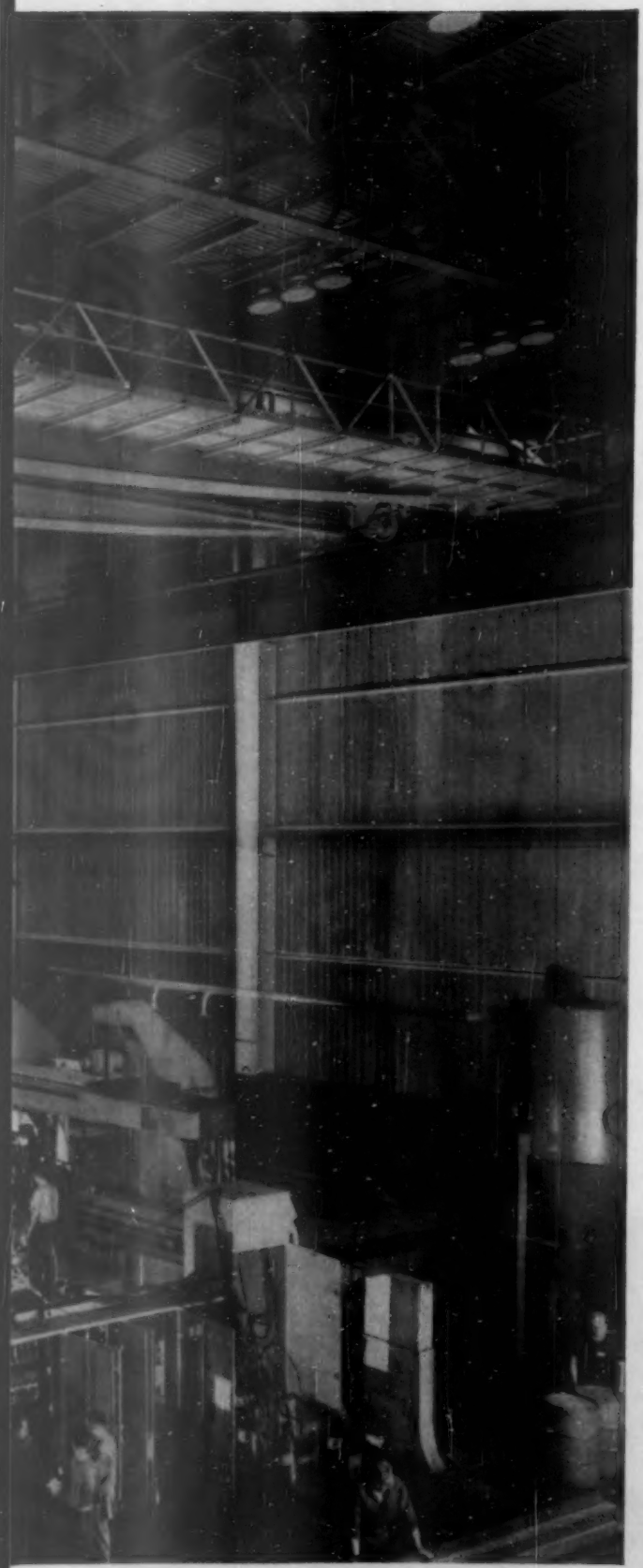
MAGNETORQUE
CONTROL
P&H



It's the CONTROL that determines whether your crane is modern!

...and P&H Electronic "Stepless" Control is the newest development in overhead crane controls. It's a remarkable crane control that provides smoother operation and more precise speed regulation. Operators can select exactly the *right* speed for any lifting and transporting movement, without being limited to "fixed" speeds.

You get a maintenance bonus in P&H Electronic Control, too. It's far simpler than previous crane controls, with fewer wearing parts to replace... or keep in inventory! The same control unit fits any size crane, and can be applied to modernize A-C cranes of *any* make.

You cannot afford to pass up this major improvement without a careful look. Be sure that P&H Electronic "Stepless" Control is included in your next crane inquiry. Dept. 125B Harnischfeger Corp., Milwaukee 46, Wisconsin.

HARNISCHFEGER

P&H ..quality and service for 74 years

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SPEEDI-DRI® SPOTLIGHT

. . . news about the world's first and foremost mineral floor absorbent

Greater Coverage, Longer Floor Life With Slip-proof Sol-Speedi-Dri Oil & Grease Absorbent

OILY, SLICK—

MODERN TRICK—SOL-SPEEDI-DRI

SAFETY QUICK!

Leading floor absorbent cuts maintenance time, costs —keeps floors safe and dry, features dustlessness

Plants all over the country using Sol-Speedi-Dri for their floors report reduced maintenance costs because of its lower volume weight and superior performance. Not just one or two, but *many* outstanding properties of Sol-Speedi-Dri provide lowest use cost.

First of all, it spreads farther, requires less manpower because the lighter volume weight provides *greater* floor coverage per pound. The thorough absorption of liquids and greases extends floor life and saves costly repairs and resurfacing. Old oil-soaked floors of all kinds can be made dry, safe . . . almost like new.

Sol-Speedi-Dri has *powerful* pulling power—it acts like a poultice soaking up oils and greases and holding them. There's no "leaking," no slippery scum. The hard granules won't break down, cake or become "mushy."

Dustlessness is an outstanding characteristic of Sol-Speedi-Dri. No discomfort for workers, no production problems because Sol-Speedi-Dri is de-dusted when produced—it's the most dust-free mineral floor absorbent made.

And you'll find Sol-Speedi-Dri has "*101 Uses*" . . . which is the title of our helpful bulletin. Send the coupon for your copy—and for a generous sample.

SPEEDI-DRI DIVISION
MINERALS & CHEMICALS
CORPORATION OF AMERICA
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. . . green-flecked to tell you you've bought the best

Speedi-Dri Division
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9480 Essex Turnpike, Menlo Park, N.J.
Distributed in Canada by G. H. Wood & Co. Ltd., Toronto

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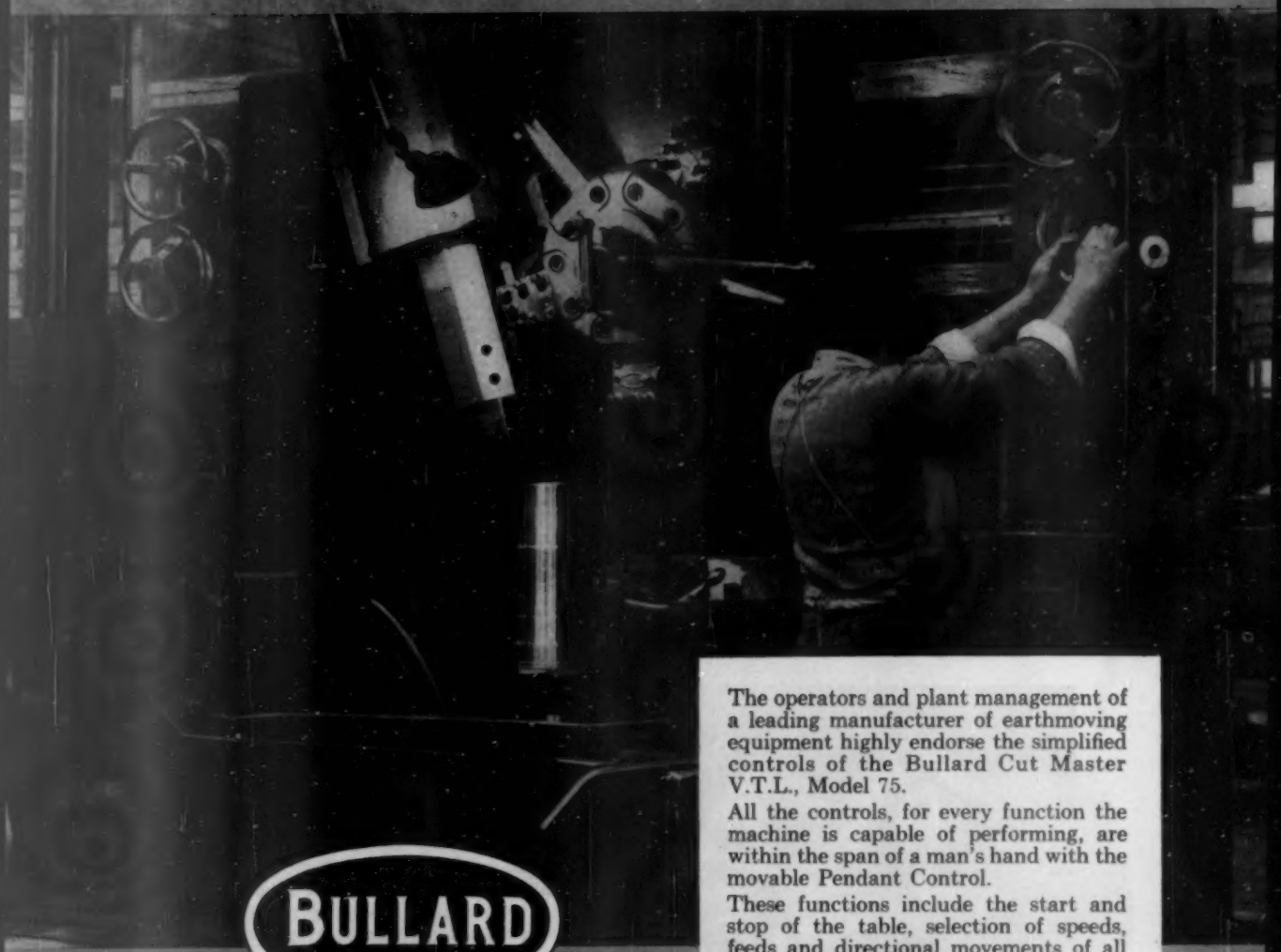
Simplified Controls win enthusiastic approval



BULLARD

The Bullard Company
Bridgeport 9, Conn.

The operators and plant management of a leading manufacturer of earthmoving equipment highly endorse the simplified controls of the Bullard Cut Master V.T.L., Model 75.

All the controls, for every function the machine is capable of performing, are within the span of a man's hand with the movable Pendant Control.

These functions include the start and stop of the table, selection of speeds, feeds and directional movements of all heads in feed or traverse.

This feature, a Bullard exclusive, improves the efficiency of the operator and increases production.

To cut costs when cutting metal

Buy BULLARD

When the Kenworth Motor Truck Company builds truck frames they put extra "backbone" in them that you can count on for life. Cold rivets are the answer . . . they can't loosen from scale-off or shrinkage . . . they always stay tight.

THERE'S HOT NEWS IN CP COLD RIVETING

CP Hydraulic Cold Riveting equipment really puts the "squeeze" on assembly time and cost. Cold rivets are easier to handle . . . you can preload rows of rivets at a time to speed assembly. Holding power is consistent because there is no strength variation due to underheating or overheating. And you save manpower — there's no waiting for rivets to heat, no forge equipment or crew required. Cold rivets completely fill the holes . . . rivets don't work loose later. Unequal expansion and shrinkage problems are completely eliminated due to cold driving and pressure control. Hydraulic yoke locates quickly on the work—crescent suspension bail has universal swivel joint and counter-balance for fast positioning. For detailed information write: *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, New York.*

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Steel Mill Windows, per 30 panes	15 Minutes
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Machine Shop Floors, per 15 sq. ft.	15 Minutes
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Pipe Threading Machine	30 Minutes
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Jenny® SERIES 1800 STEAM CLEANER

SERIES 1800 . . . one of 80 different models and types.

Maintenance superintendents report that Hypressure Jenny cuts cleaning time to one-tenth the time required by ordinary methods. Reduces down-time to a minimum. Regardless of how large or how small your cleaning job, there is a Hypressure Jenny to fit your requirements. In addition, the revolutionary Jenolizing process prevents rust after steam cleaning. Write for details now.

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Hypressure Jenny Division • Coraopolis, Pennsylvania

Please send me information on "How Industry Gets More Productive Hours" with Hypressure Jenny Steam Cleaners. 86

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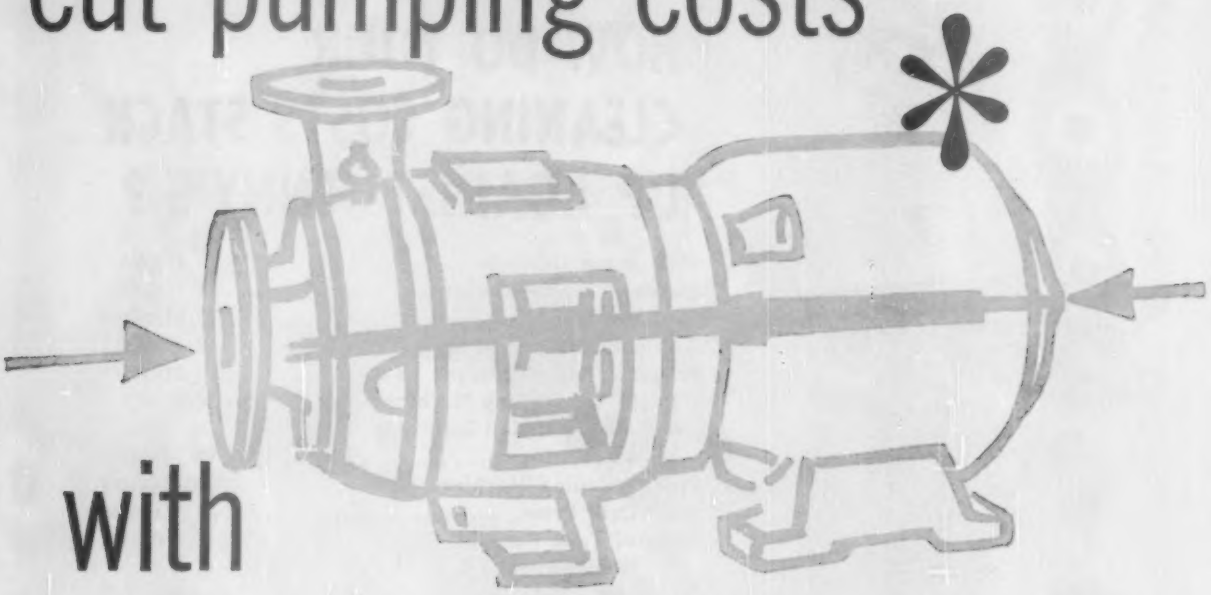
cut pumping costs



with motorpump dependability

IN INDUSTRY AFTER INDUSTRY Ingersoll-Rand Motorpumps have shown that rugged construction and modern design pay off in dependable, trouble-free operation. Motorpumps give pumping power for their compact size with exclusive features that give maximum pumping efficiency.

From the world's largest manufacturer of centrifugal pumps, Motorpumps are available in the widest range of sizes and types to meet *exactly* your pumping requirements. You get delivery from 5 to 2800 gallons per minute; and heads up to 650 feet, horsepower range from ¼ through 75.

Get full information on cost-saving Motorpumps by writing today for latest bulletins.

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No Alignment Problem

No coupling or alignment is required with the Motorpump. The pump and motor utilize one common heavy shaft.

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AUTOMATIC'S NEW SKY-HI-LIFT

Operates Easily in Truck Trailers ...Yet Lifts Loads Sky High

Now in 2,000 and 3,000 lb. capacity* (based on 48" long load)

Check for yourself—no other truck with a collapsed height of 68" can lift 144"

The Sky-hi-lift—teamed with Automatic's battery-powered, stand-up, end-controlled Docker—is the answer to a highly efficient, highly mechanized warehouse operation. You get all the advantages of the Docker's versatility and maneuverability, plus these exclusive Sky-hi-lift features:

High 144" Lift...To take advantage of your high bays; increases warehouse capacity a full third.

Low 68" Mast...Lets you load and unload trucks, trailers, rail cars, and enter low-door elevators.

2,000 and 3,000 lb. capacity...the right weight for entering trailers without fear of going through the floor.

In short, mount the Sky-hi-lift on a Docker and you get one truck that does the job of two—with no need to transfer loads. Also available for other Automatic trucks. Write today for information on how the Sky-hi-lift can help you squeeze more profit out of existing space; and ask about convenient lease and purchase terms.

*Similar type of mast available for heavier capacities.

Electric Automatic Industrial Trucks

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Division of The Yale & Towne Manufacturing Company
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WORLD'S LARGEST EXCLUSIVE BUILDER OF ELECTRIC-DRIVEN INDUSTRIAL TRUCKS

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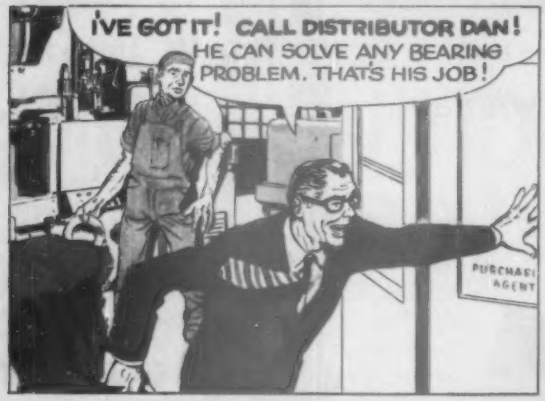
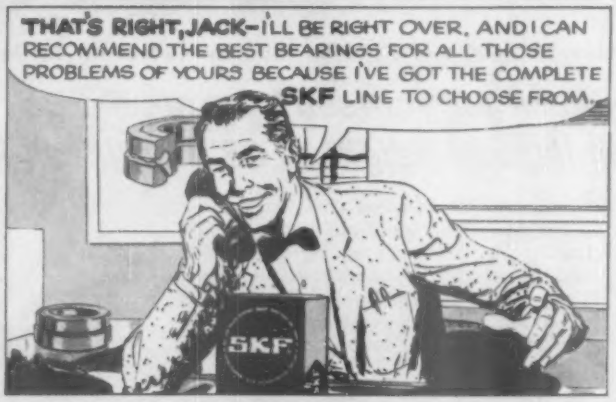
The real life adventures of DISTRIBUTOR DAN

the SKF bearing man

I'VE GOT A BEARING PROBLEM! IS THERE AN ANTI-FRICTION BEARING THAT'LL TAKE HEAVY THRUST LOADS AT HIGH SPEEDS – ON A VERTICAL SHAFT?
PURCHASING AGENT




THAT'S RIGHT, JACK– I'LL BE RIGHT OVER. AND I CAN RECOMMEND THE BEST BEARINGS FOR ALL THOSE PROBLEMS OF YOURS BECAUSE I'VE GOT THE COMPLETE SKF LINE TO CHOOSE FROM.
SKF

ONLY SKF MAKES ALL 4 KINDS OF BALL AND ROLLER BEARINGS... AND WITH THAT KIND OF VARIETY I CAN KEEP AN OPEN MIND ON JACK'S PROBLEM, AND ON YOURS TOO!

WHEN YOU'VE GOT ANY KIND OF BEARING PROBLEM WE'LL FIX YOU UP IN A HURRY. CALL YOUR NEARBY AUTHORIZED SKF DISTRIBUTOR TODAY!
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EVERY TYPE–EVERY USE

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SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

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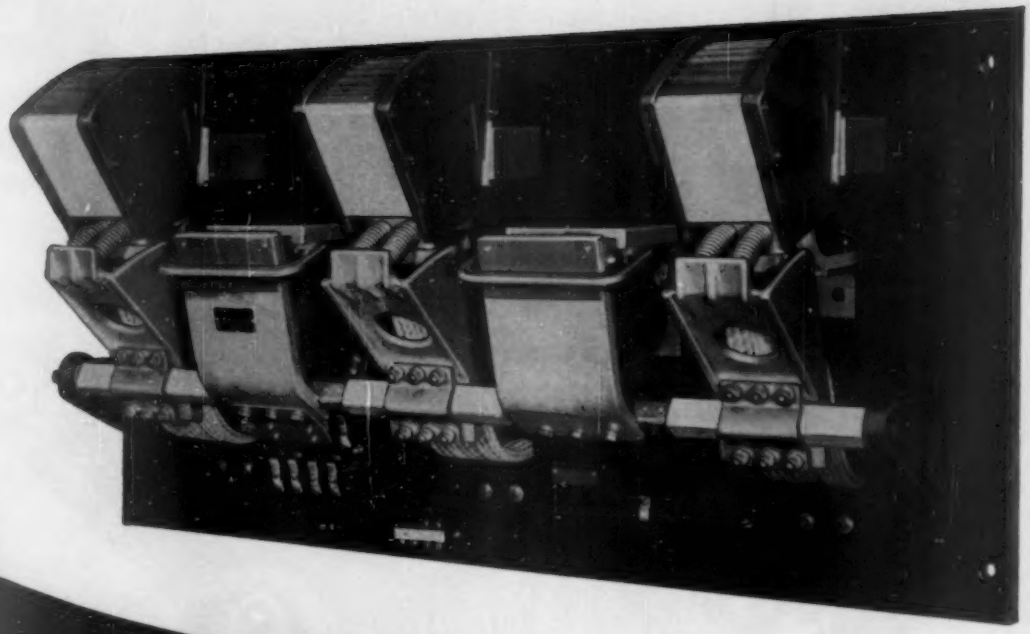
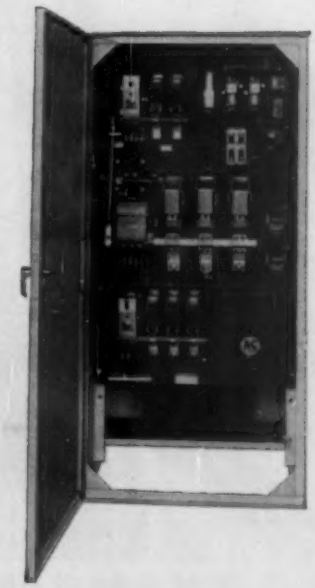


Rugged* Simplicity

increases contactor life



Assures reliability of reduced voltage motor starters

ONE look reveals the clean, balanced design of Allis-Chalmers contactors. Fewer parts eliminate many potentially troublesome areas—mean less wear. Simple, solid construction and high interrupting capacity are positive assurance of reliability.

When you specify reduced voltage starters be sure to get the reliable, long life features provided by Allis-Chalmers contactors. It is these contactors that make all 600 volt Allis-Chalmers Size 4-8 reduced voltage starters the dependable performers they are.

Get all the facts. Call your nearby A-C sales office or distributor, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

*7th meaning, Webster's New Collegiate Dictionary, Second Edition.

A-5784

ALLIS-CHALMERS

St. Vincent's Hospital, Green Bay, Wisconsin

More than 177 *miles* of Roebling Electrical Wire and Cable form the dependable electrical system of this important new Midwest hospital!

Unfailing electrical service in hospitals is a life and death matter. Dependable building wire is a prime requisite. Beemster Electric Company, Green Bay, Wisconsin, the electrical contractor, chose Roebling Cable *—938,000 feet of it*, in 15 types—for this ultramodern 11-story hospital.

There's a Roebling Cable for every electrical or telephone application... *and wise contractors know there's none better.* Choose *Roebling* where long-term dependability is vital! For information or service, call your nearby Roebling distributor, or write Electrical Wire Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

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Subsidiary of The Colorado Fuel and Iron Corporation

Roebling Electrical Cables come in scores of types and sizes for every type of modern service.

NEW!
LYON
OFFICE
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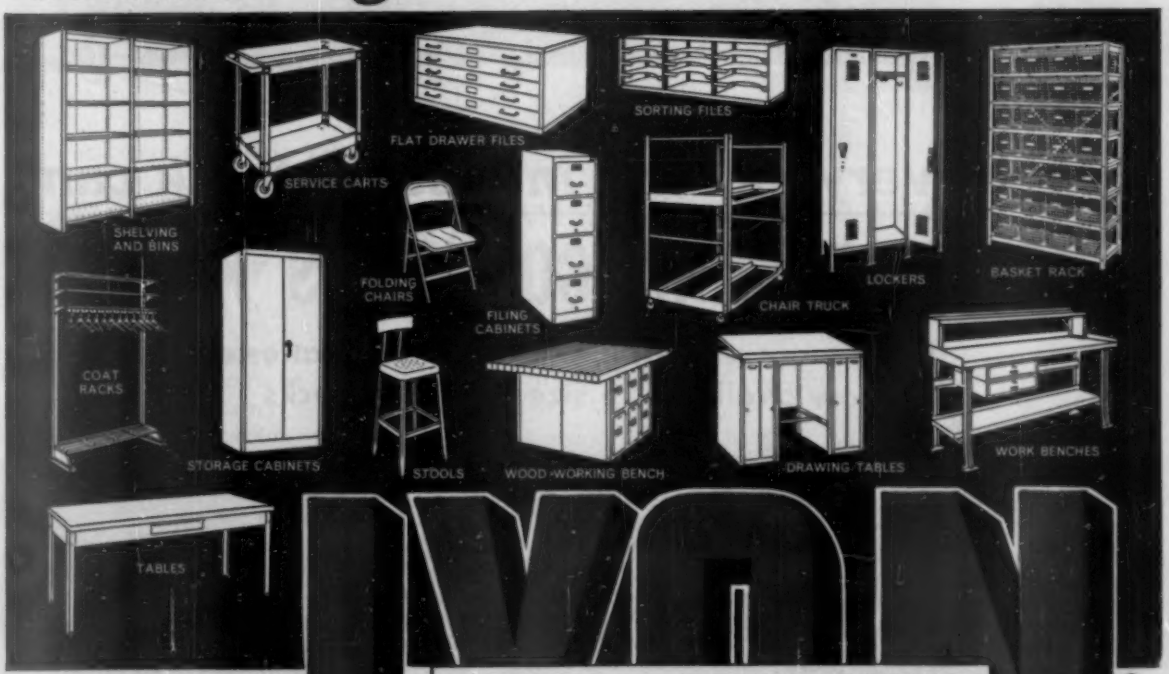
HIGH IN QUALITY...
LOW IN PRICE!

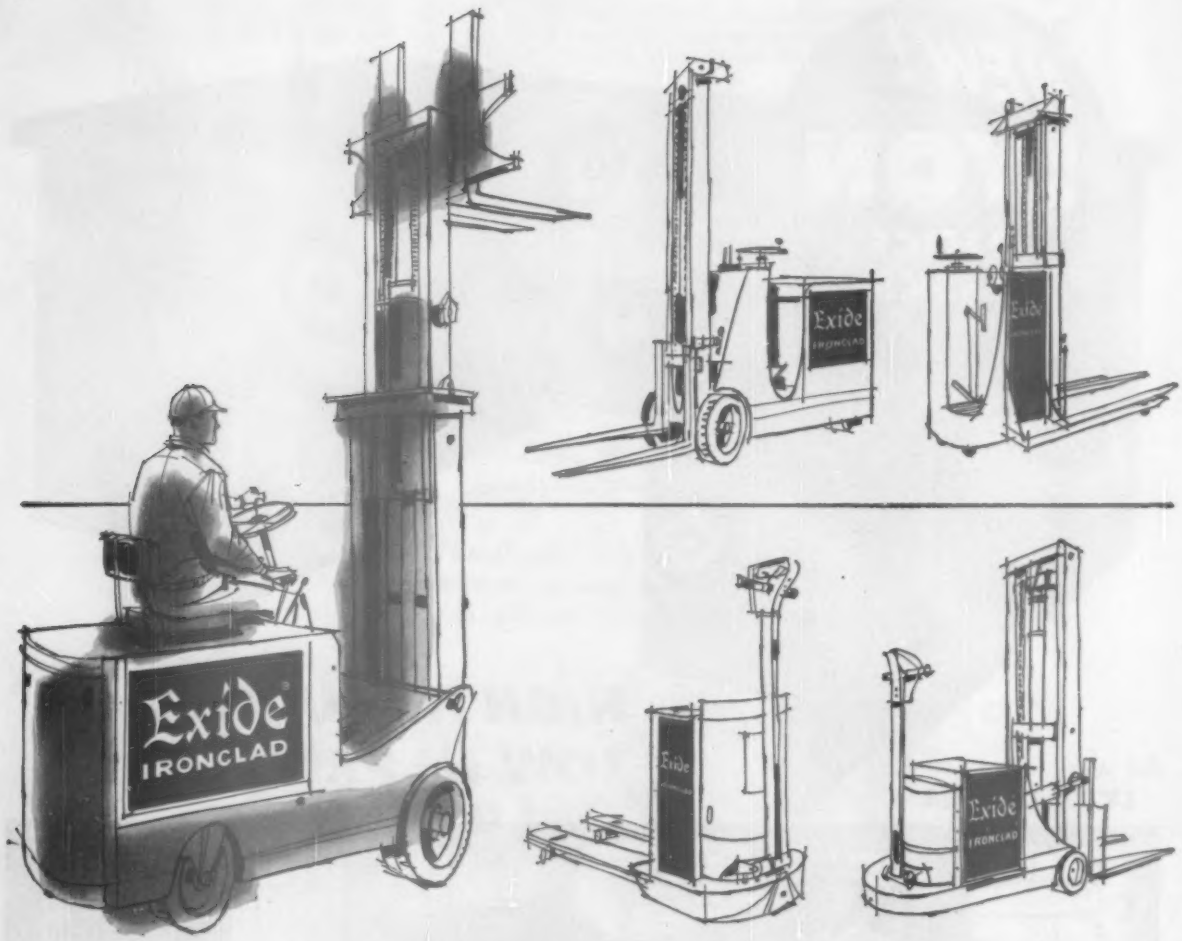
Ask your
LYON DEALER



LYON®
STEEL EQUIPMENT

LYON METAL PRODUCTS, INC.
General Offices:
912 Monroe Ave., Aurora, Illinois
Factories in Aurora, Ill.
and York, Pa.
Dealers in All Principal Cities

For more facts circle 499 on Reader Service Card



Now every electric industrial truck can

DO MORE WORK, COST LESS TO USE

New, more powerful Exide-Ironclad Batteries now available in sizes to fit *all* trucks

Take any electric industrial truck. Install one of the new higher capacity Exide-Ironclad Batteries and you can get more work out of it at a lower annual cost than you ever did before.

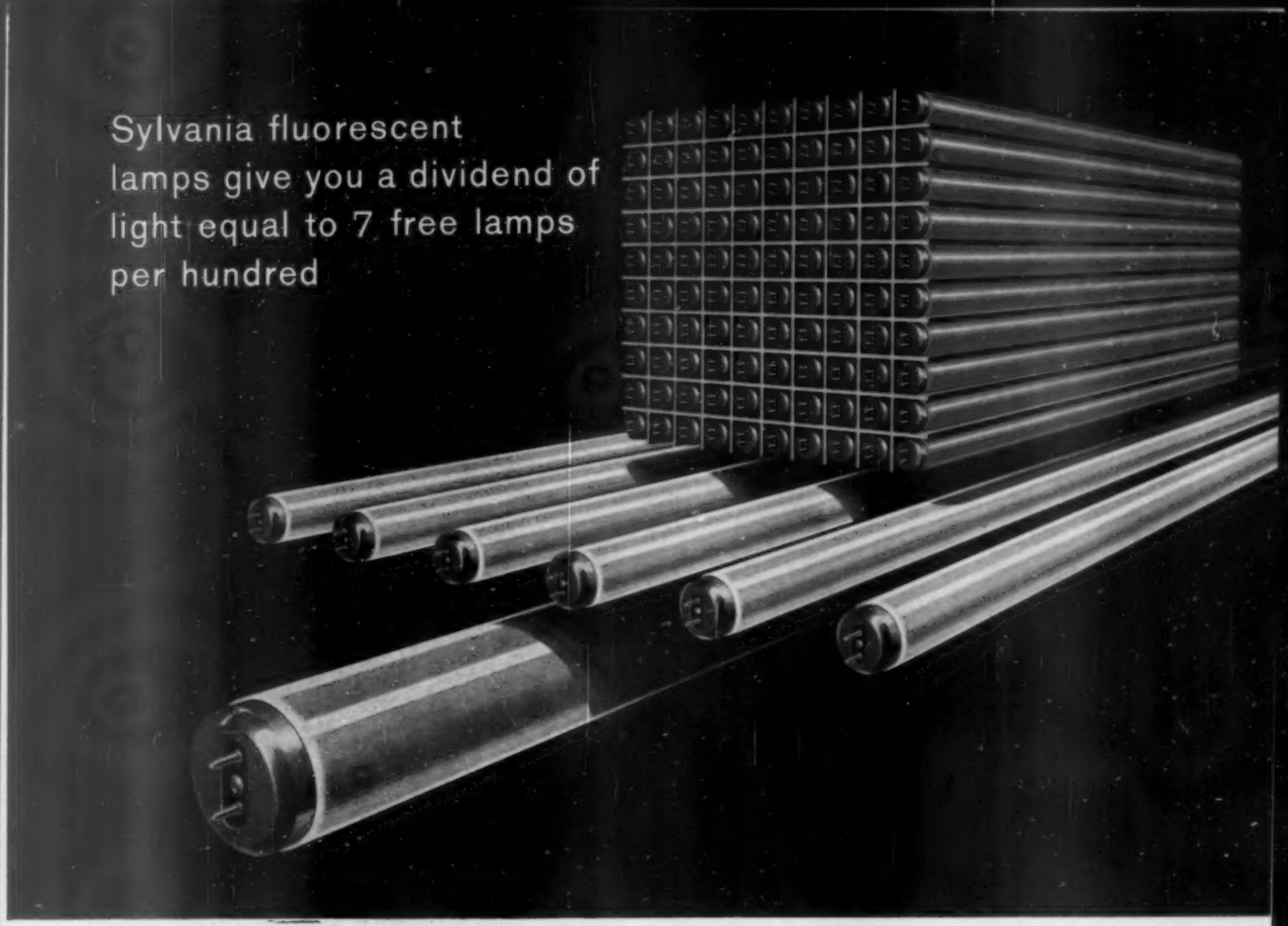
They pack up to 44% more power than batteries in the past. But these new Exide-Ironclad Batteries have the same outer dimensions . . . fit right into your present trucks . . . provide added power so your trucks can lift more, carry it farther, move it faster, make more trips. Yet they actually cost you less per ampere-hour and offer a longer life potential for greater long-range economy.

Save money, too, on applications where you don't need additional power. New Exide-Ironclad Batteries are available in the same capacity as old batteries, but in a more compact size and up to 15% lighter for greater flexibility and at a lower price.

When you buy batteries for your electric industrial trucks, make sure you get all the economy only the new Exide-Ironclad Batteries can offer you. Write for complete details. Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 2, Pa.

Exide®

Here's the secret. Unique advanced tubular construction. Every positive plate packs more power. So every battery gives you greater efficiency—a more compact battery for a given capacity rating.



Sylvania fluorescent lamps consistently deliver more light throughout useful life

Another reason why

Sylvania Fluorescents give you more light at lower cost than all other brands

Advanced engineering makes Sylvania fluorescent lamps superior in many ways—makes light a better tool of production to increase profits

Sylvania lamps deliver more light when new. And they continue to maintain their greater light output throughout useful life by as much as 7%.

For example, at 3,000 hours, in a single-shift operation, 100 Sylvania lamps deliver the light output of about 107 ordinary fluorescents. In effect, you get a Sylvania dividend of light equal to 7 free lamps.

Moreover, this dividend of light means you get more light-per-lamp from the power you buy.

Because of their greater maintained light output, Sylvania fluorescent lamps offer more opportunities for economy. They extend the period between lamp replacements... they reduce work interruption . . . and cut labor costs.

This is another example of how Sylvania builds extra value into fluorescent lamps to help cut your lighting and operating costs.

Let your local Sylvania Representative show you how Sylvania's superiority can save you time and money. Call him today or write:

SYLVANIA LIGHTING PRODUCTS
Division of SYLVANIA ELECTRIC PRODUCTS INC.
60 Boston St., Dept. 8L-3109, Salem, Mass.
In Canada: Sylvania Electric (Canada) Ltd.
Shell Tower Building, Montreal

SYLVANIA Lighting Products

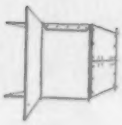
make light a better tool for profits

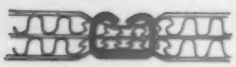
LIGHTING • TELEVISION • RADIO • ELECTRONICS • PHOTOGRAPHY • ATOMIC ENERGY • CHEMISTRY-METALLURGY

For more facts circle 501 on Reader Service Card

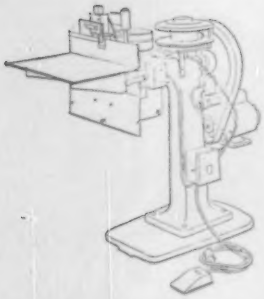
CLOSURE IDEA BULLETIN

For Users of Fibreboard Boxes



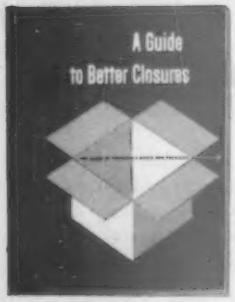


Box components--liners and corrugated media--are all fastened together with the positive clinch provided by wire stitching... clinches all flaps, too...especially important for boxes with wax, lacquer, or other special finishes.



600 full overlap boxes per shift are easily loaded and closed by one man with the HOHT Silverstitcher...can just as easily and effectively close 5-panel folders, and telescope boxes. W1-4 gives full details.

Free booklet, "A Guide To Better Closures" ...an impartial report on glue, tape, staple and wire stitching closure methods ...points the way toward greater savings, superior product protection...send for your free copy today.



Color comes to wire stitching...increases sales appeal of package. Acme Steel Colorstitch Stitching Wire is chip resistant ...available in a choice of 10 standard colors...normally available in 10 lb. coils...25 and 50 lb. coils available on special order. Colorstitch size available from stock is .103" x .020"...other sizes on order. AD-152 gives complete information.

Your Acme Idea Man is thoroughly trained in fibreboard box closure. His know-how is backed by the 75 years Acme Steel has helped industry solve closure problems. Write Dept. FAW-98, Acme Steel Products Division, Acme Steel Company, Chicago 27, Illinois, for information on the complete line of Acme Steel box, book and metal stitchers.

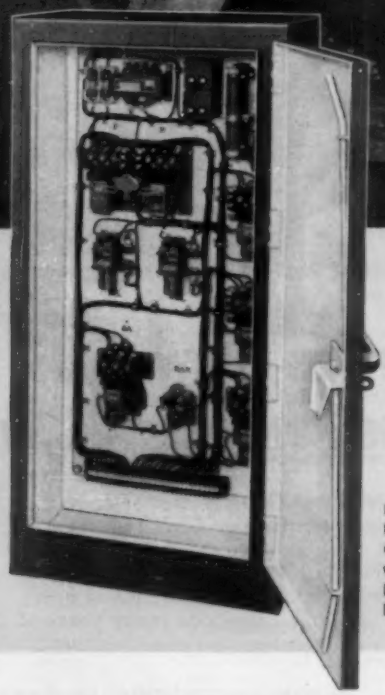
ACME STEEL WIRE STITCHING

new

EC&M

"VL" AC CRANE CONTROL

for light
industrial* crane service



Form VLRP Reversing Controller with Frequency Plugging Relay

• Designed specifically for light industrial AC cranes, EC&M's full magnetic "VL" control assures smoother, more efficient operation than manual control. On cab-operated cranes, operators have greater freedom of movement with small masters mounted up-front and controllers at rear of cab. "VL" control is also available for cranes operated from floor by pendant push-button master.

EC&M "VL" Controllers are compact and have vertical-action type contactors. The well-known EC&M Frequency Relay provides accurate control of accelerating operations on Dynamic Lowering hoists. Timed acceleration is provided for Reversing hoist, Bridge or Trolley controllers. "VL" controllers have "individual protection," eliminating the need for separate protective panel. They are front-connected and wired for easy inspection and maintenance.

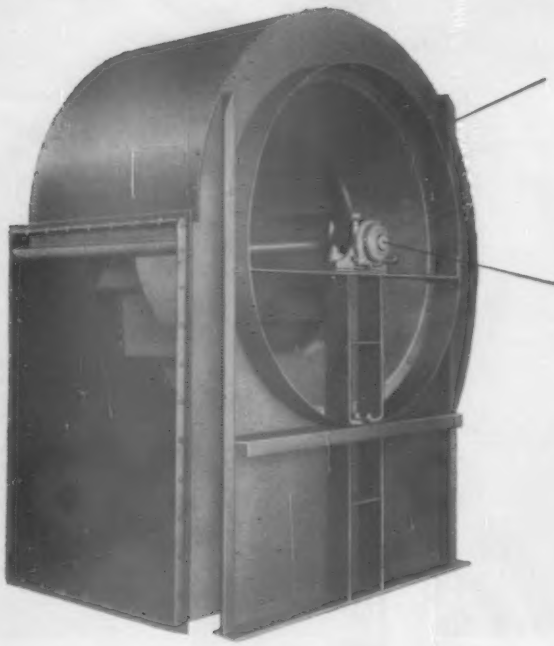
A companion line to EC&M's "PT" Control for DC cranes, this new "VL" control is far superior to manual control previously specified purely on the basis of price.

*NEMA Service Classification II applications

Write for Bulletin 6431 for complete details

THE ELECTRIC CONTROLLER & MFG. CO.
A DIVISION OF THE SQUARE D COMPANY
CLEVELAND 28 • OHIO

1587



HIGH-EFFICIENCY STREAMLINE WHEEL

Large-area, backwardly inclined blades have true nonoverloading power characteristic. Medium-speed operation with minimum fan size is ideal for either direct connection to motor *or* V-belt drive.

CHOICE OF HEAVY-DUTY BEARINGS

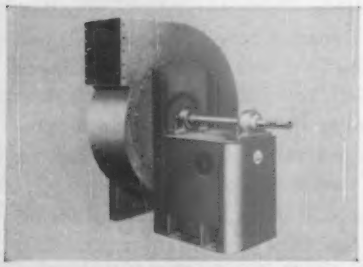
Standard – Heavy-duty, self-aligning ball-bearing pillow blocks.
Optional–Babbitted-sleeve, self-aligning type or roller pillow-block bearings.

American Blower HS Fans hit top efficiency at medium speeds with minimum fan size

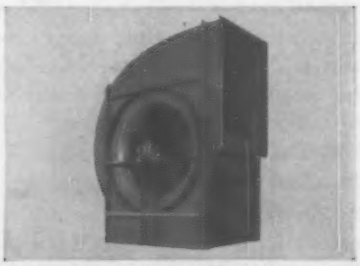
Versatile is the word for American Blower fans. For among this complete line of precision-built fans, you'll find an economical solution to *your* air-moving problem – whether it be ventilating, heating, drying or processing. And the heavy-duty construction of every American Blower fan guarantees you many years of low-cost, minimum-maintenance service.

Nationwide, 73 American Blower factory branch offices are ready to serve you. At your request, skilled sales engineers will help select the equipment to handle your air-moving job best within your budget. Call today! American-Standard,* American Blower Division, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

It pays to standardize on American Blower fans for every duty!



Industrial Fans – 3 optional wheels handle air, material, long shavings.



Sirocco Fans – low speed, quiet operation; move more air per revolution.

Axial Fans – move high volumes in minimum space; flexible installation.

* American-Standard and Standard® are trademarks of American Radiator & Standard Sanitary Corporation.

AMERICAN-Standard
AMERICAN BLOWER DIVISION

The FALK all-steel Shaft Mounted Drive

- Versatile
- Efficient
- Economical
- Compact

To Plant Engineers:

The versatility of the Falk Shaft Mounted Drive makes it the practical choice for many machines in your plant.

This compact unit mounts on the driven shaft, thereby solving many problems of restricted space. You can obtain almost any output speed between 420 and 5 rpm by selecting the proper single or double reduction unit and the proper sheave or sprocket ratio.

Do you need both horizontal and vertical drives? Standard Falk Shaft Mounted Drives are available for either application; or you can easily convert a horizontal unit to a vertical unit, right in your plant.

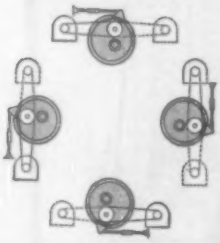
Initial cost is low, you get immediate delivery from shelf stock, and installation is quick and easy.

★

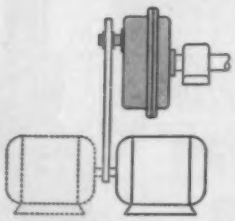
FALK Shaft Mounted Drives are available from factory and distributor stocks *from coast to coast.* See your Falk Representative or Distributor—or write direct for your copy of **Bulletin 7100.**

SEVEN SIZES—½ to 50 HP—420 to 5 rpm—single and two double reduction ratios—output torque ratings up to 31,500 lb-in.

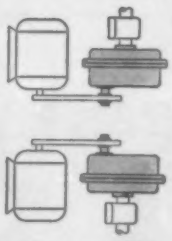
A few of the many ways this reducing unit can be applied—



ANY POSITION



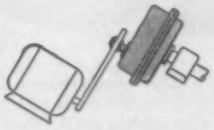
MOTOR EXTENDED —or below the unit



VERTICAL—UP or DOWN

VARIABLE SPEEDS... through use of variable-pitch sheaves—automatic belt adjustment with tie-rod adjustment

OVERLOAD RELEASE... that will slacken belts and cut off power if overload occurs



INCLINED SHAFT... Any standard unit can be mounted in vertical or inclined position by a simple rearrangement of oil drains

THE FALK CORPORATION, 3001 W. CANAL ST., MILWAUKEE 1, WIS.

Representatives and Distributors in Most Principal Cities

Manufacturers of

- Motoreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
- High Speed Drives
- Special Gear Drives
- Single Helical Gears
- Herringbone Gears
- Marine Drives
- Steel Castings
- Weldments
- Contract Machining

FALK

...a good name in industry

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POWELL

world's largest family of valves

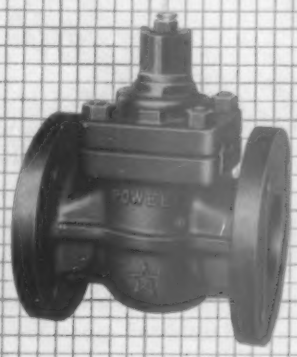


Fig. 2201—Semi-steel Lubricated Plug Valve for 175 pounds W.O.G. Single gland type. Sizes 1" to 4". Can be supplied with screwed ends. Other types and higher pressure valves are available.

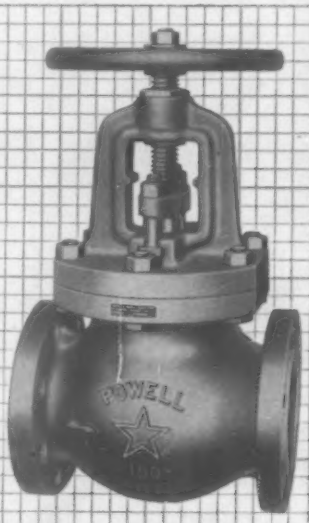


Fig. 1531—Steel Globe Valve for 150 pounds W.S.P. Outside screw rising stem and yoke. Powell Steel Valves are available for pressures through 2500 pounds.

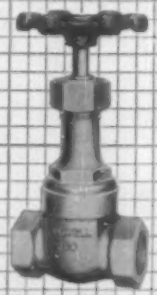


Fig. 1832—Small Stainless Steel Gate Valve for 200 pounds W.P. Screwed-in bonnet, inside screw rising stem, accurately guided solid wedge disc. Also made in Nickel and Monel Metal.

Fig. 512—Small Bronze Gate Valve for 150 pounds W.S.P. Inside screw non-rising stem. Solid wedge disc. Can also be supplied with flanged ends.

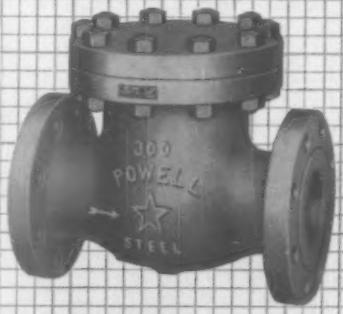
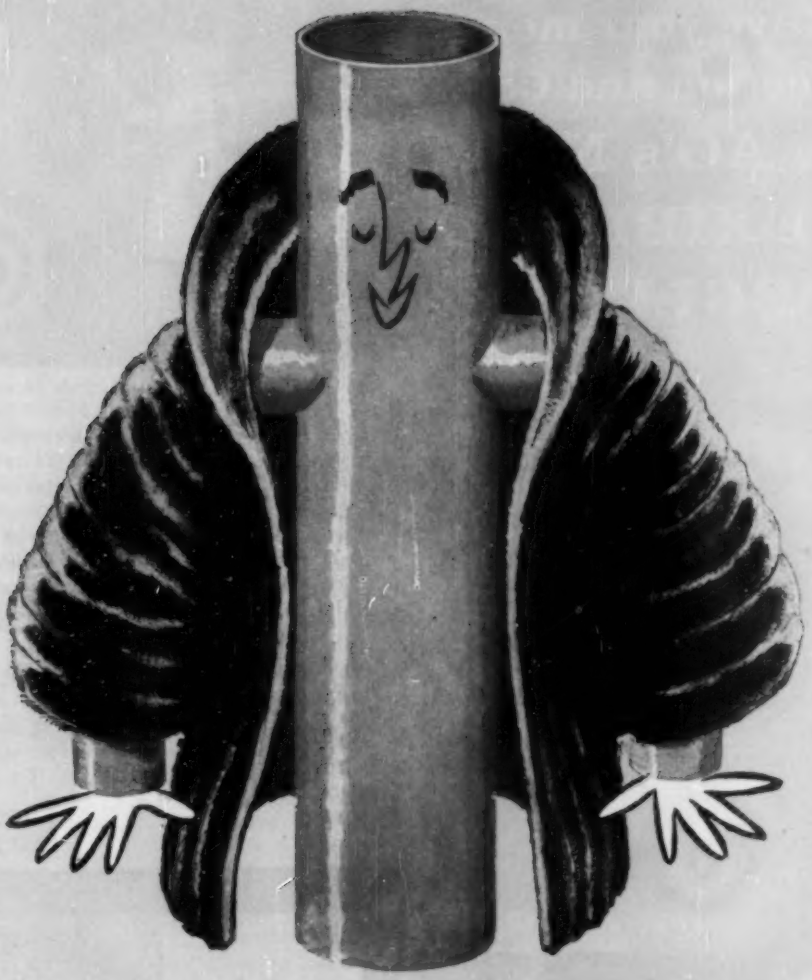


Fig. 3061A—Newly designed Steel Swing Check Valve for 300 pounds W.S.P. Has straight flow through area when disc is in wide open position.

Fig. 1444—Large Iron Body Bronze Mounted Gate Valve for 125 pounds W.S.P. Outside screw rising stem and yoke, double wedge disc. Also available with solid wedge disc.

NO MATTER WHAT your flow control requirements, Powell offers more kinds or types of valves, available in the largest variety of metals and alloys. Powell distributors, located in all principal cities, maintain inventories to fill almost any need. For special engineering problems, write direct to:

THE WM. POWELL COMPANY • *Dependable Valves Since 1846* • **Cincinnati 22, Ohio**



WHY USE MINK COATING?

You can't afford luxuries in these times of tighter operations! You must secure maximum corrosion protection at the best price. Protective Coatings of the Plastics and Coal Chemicals Division offer you high-grade coal-tar materials that have been proved and improved for decades—at costs that mean lower maintenance expense for you. Compare the cost and performance of Cold Coatings with other fine protective materials. Apply our Cold Coatings by brush or spray without heating or activators. Properties include chemical resistance, heavy coating thickness per coat, and fast drying.

Use these economical Cold Coatings on pipes, valves and connections; fences, grates and other open metal work; interiors of potable water tanks, cranes, conveyors, and handling equipment; and other areas.

Write for full information.

PLASTICS AND COAL CHEMICALS DIVISION
Formerly part of the Barrett Division
40 Rector Street, New York 6, N. Y.
In Canada: Allied Chemical Canada Ltd., 1450 City Councillors St., Montreal

Allied Chemical

For more facts circle 507 on Reader Service Card

Give your men the Protection and Comfort of AO's NEW FLEXIBLE MASK GOGGLE SERIES

Eye Protection

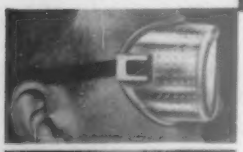
Here's a great new *series* of light, comfortable, flexible mask goggles which retain the comfort of the previous series — with a smoother face — hugging fit at the nose and temples! Particularly noteworthy is the LARGER, MUCH DEEPER MASK — affords greater protected area and fits easily over Rx and personal glasses. Lens is interchangeable, one-piece acetate curved slightly for wider vision. Headband is easily adjustable elastic.

482A — clear frame, clear or green lens. (483A with green frame). For protection against flying particles in babbitting, chipping, cutting rivets, light grinding, hand or machine tool work or where spark-explosion hazards exist. Note ample perforations for ventilation.

482A — For Impact Protection

484A — For Chemical Splash Protection

484A — Basic structure similar to the 482A but with four ports (instead of perforations). Provides safe indirect ventilation and anti-fogging while protecting against chemical splashes. Resistant to acids and alkalies. Clear frame, clear or green lens. (485A with green frame).



Deeper cup — increased lateral protection. Easily fits over safety Rx and personal glasses.

Modified nosepiece. Aids comfort and fit.

486A — For protection against dangerous light rays, glare, flying sparks and scale in acetylene welding, cutting, burning, brazing and furnace work. Has black lens adapter which takes the standard AO lens and regular 50mm. round filter lenses and cover lenses. Goggle has Noviweld filter lenses, shades 3, 4, 5, 6. For chipping and grinding, companion Model 489A comes with clear frame, clear transparent adapter and Super-Armorplate lenses.

487A — Similar to our 483A except for *transparent* green frame. For maintenance men, truck drivers and factory workers where glare from overhead lighting is a problem and where impact protection is needed.

Always Insist on the AO Trademark on Lenses and Frames

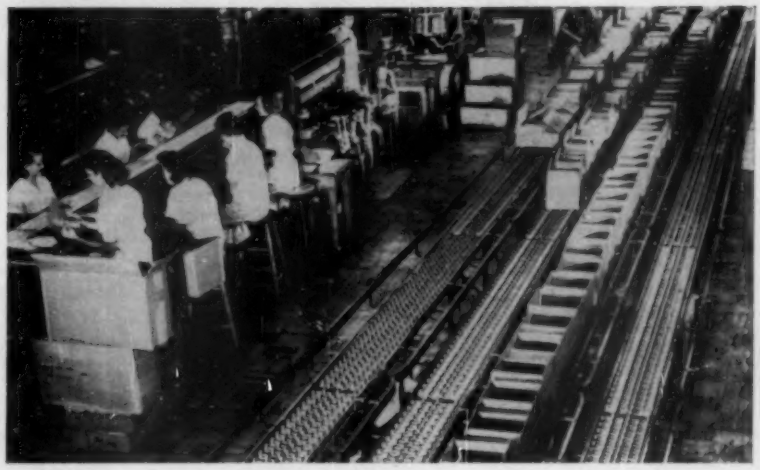
American Optical
COMPANY
SAFETY PRODUCTS DIVISION

1833-1958 • 125 LEADERSHIP YEARS

SOUTHBRIDGE, MASSACHUSETTS
Safety Service Centers in Principal Cities

RAPISTAN HANDLING Ideas

How to "Tool up" for Efficient Handling with Rapistan® Conveyors



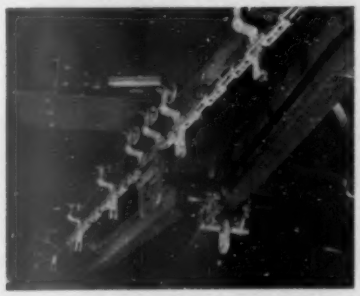
Like a four-lane super highway, Rapistan conveyors line up the cartons for a fast pass through the case sealer. Carton traffic moves in a steady flow. No jam-ups, even at peak rush periods.

PACKAGING AND SHIPPING SHOULD BE WRINKLE-FREE

Even a manufacturer of hand creams can have wrinkles – in his handling system. But Rapistan helped this one smooth them out. Four lines of Rapid-Wheel gravity conveyor handle the job. They move filled cartons from packing operations to a single, centralized case sealing station.

The gravity conveyor now separates cartons by size and accumulates them for longer, more efficient "production" runs through the case sealer. "Down time" for adjusting the sealing machine is reduced. A maze of multiple handling is eliminated, and a lift truck traffic problem has been solved. For examples of other Rapistan systems at work, circle No. 1 on the coupon.

NEW POWER-PUSH OVERHEAD CONVEYOR



Now you can have the advantages offered by "power and free" overhead trolley conveyor, at a fraction of the heavy-duty conveyor cost, in new Power-Push conveyor from Rapistan-Keystone, Inc.

Any portion of the work being conveyed can be diverted from the power line to a "free" track (automatic or manual controls) for storage, special processing, assembly, order selection, inspection or testing, then returned to the power line when desired. Power-Push is economically practical for interrupted overhead flow applications in small, medium and large manufacturing plants and many service industries. **Circle No. 2.**

Cure Inventory Headaches With Rapistan Flow Rack™

Taking inventory, that perennial nuisance in every business, is fast and easy when you store goods in Rapistan Flow Rack. No wasted time counting every item by hand count. The inventory taker simply identifies parts by the numbers labeling each hatch opening in the rack. He knows how many parts each pan contains. By viewing the number of pans in each hatch opening, he gets the total count.

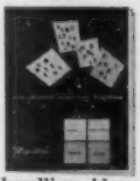
In this specific rack, over a hundred different items are stored in a compact and orderly way. Wouldn't you like to take your next general inventory without having to shut down operations? **Circle No. 3** for information.

If you use small parts in large quantities, Flow Rack is the most efficient way to store them — and count them. This inventory counter takes the tally in a matter of minutes.

Take Tight Handling Turns With This New Turn Table

Rapistan's new, powered "turn table" gives you a smooth, protected turn when transfering materials between adjoining lines of power or gravity conveyor. This improved Power Turn Table features a more powerful drive, and a die-formed table of heavy steel plate. For complete information on new model and application ideas, **circle No. 4** on the coupon.

NEW RAPISTAN IDEA BOOK ISSUED THIS MONTH



Over 70 good, practical ways to handle materials efficiently in receiving, manufacturing, processing, warehousing and shipping are illustrated and described in this new handbook of materials handling ideas. Send for it today. **Circle No. 5** on the coupon.

Rapistan
new ideas in materials handling

The RAPIDS-STANDARD CO., Inc.
375 Rapistan Bldg. Grand Rapids 2, Mich.

circle the items of particular interest to you, clip this coupon, and mail it attached to your letterhead

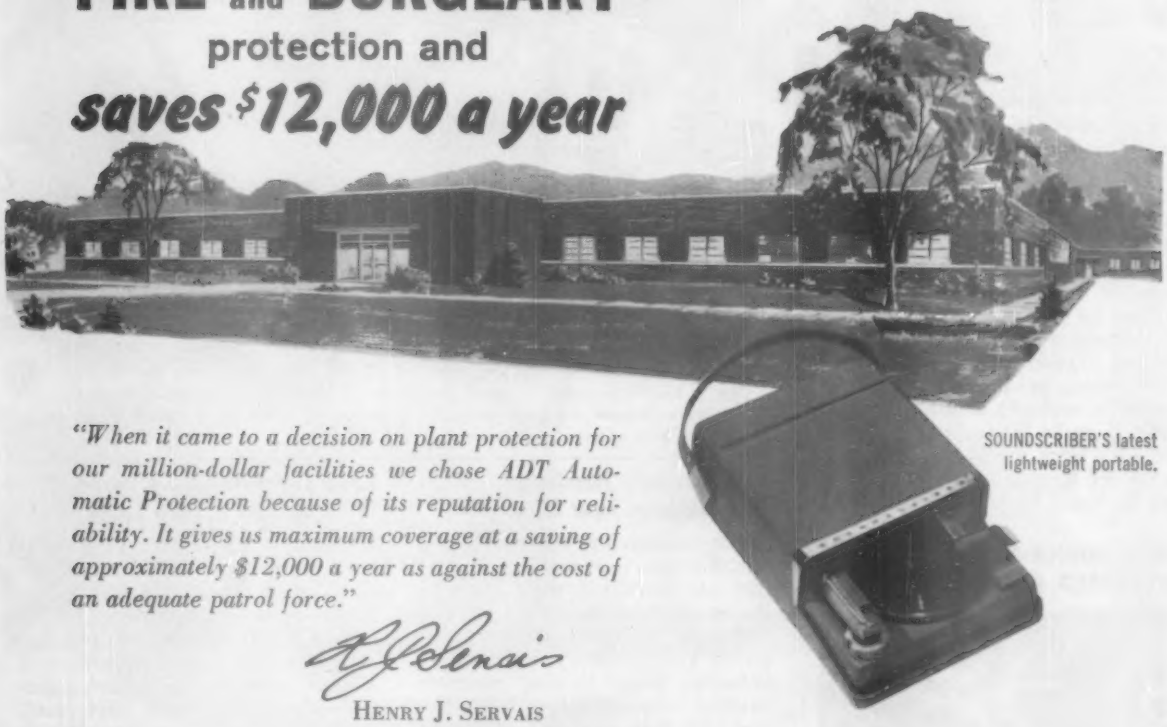
1 2 3 4 5

THE SOUNDSCRIBER CORPORATION, North Haven, Conn.

safeguards its property *Automatically* gets better

FIRE and BURGLARY

protection and *saves $12,000 a year*



SOUNDSCRIBER'S latest lightweight portable.

"When it came to a decision on plant protection for our million-dollar facilities we chose ADT Automatic Protection because of its reputation for reliability. It gives us maximum coverage at a saving of approximately $12,000 a year as against the cost of an adequate patrol force."

H. J. Servais

HENRY J. SERVAIS
Executive Vice President

Claimed to be the most modern in the dictating equipment industry, the new plant of The Sound-Scriber Corporation is an outstanding example of efficiency in manufacturing and operating methods.

Protection against fire, burglary and other hazards is completely *automatic*. In case of fire, ADT Waterflow Alarm Service summons the fire department *automatically*. ADT Burglar Alarm Service, including Photoelectric and Ultrasonic Systems, *automatically* notifies police of unauthorized entry to the building or the vault. ADT Heating Supervision *automatically* gives warning of low steam pressure or low room temperature.

Like Mr. Servais, alert businessmen from coast to coast know that ADT Automatic Protection Services give greater security for property, profits and employees' jobs than can be obtained by other methods—and *at less expense!*

Whether your premises are large or small, old or new, sprinklered or unsprinklered there is a combination of ADT Automatic Protection Services to meet your requirements. Call our local sales office if we are listed in your phone book; or write to our Executive Office.

ADT

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AMERICAN DISTRICT TELEGRAPH COMPANY
A NATIONWIDE ORGANIZATION
Executive Office: 155 Sixth Avenue, New York 13, N. Y.

up, UP again!

goes the value of the RLM LABEL on INDUSTRIAL LIGHTING Units!

NOW you can specify RLM-Labeled *Lighting Units Specially Designed for Moist or Dusty Locations!*

NOW, *also available* *RLM units for the high-output 800 ma. Lamps!*

Now, extra value for all of the thousands of types, sizes and styles of fluorescent and incandescent lighting units which are available with the RLM Label!

Broadened RLM fluorescent specifications cover individual and continuous row tandem mountings for simplified installation, more rigid construction.

RLM's new Specs SS-1 and SS-2 for Special Service Fluorescent Units typify the RLM Label's even greater value to everyone who buys, specifies or installs industrial lighting equipment. These important new "SS" specs, from the one-piece, all-porcelain enameled steel reflector housing to corrosion-resistant lampholders, set up standards that insure lighting equipment that can withstand unusual amounts of non-hazardous dust and moisture.

New RLM Specs for units utilizing high-output 800 milliampere lamps, point up the thorough broadening of RLM Standards to keep pace with latest lighting developments. In fact, every specification in the new RLM Book has been strengthened, made more embracing, revised UP! Send for your FREE COPY of the 1958 RLM Specifications Book.

YOUR BASIC ASSURANCE OF HIGH QUALITY

This label identifies the RLM-certified lighting equipment of 27 leading manufacturers

R-250

For FREE 1958 Specifications Book, Write: RLM Standards Institute, Suite 8299, 326 West Madison Street, Chicago, Illinois

"How can we squeeze 2½¢ out of production costs?"

Questions like this are nothing new to Ryerson specialists.

With their broad experience in steel applications, they can often suggest ways to save—a different type or analysis, steel in ready-to-use form, or an improvement in fabrication methods that will shave a few pennies off the final unit cost without impairing quality.

Add to this service the nation's largest steel stocks, unequaled processing facilities, fast delivery to meet any emergency—and you have the reasons why more steel users call Ryerson.

RYERSON CERTIFIED QUALITY

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Member of the INLAND Steel Family

Principal Products: Carbon, alloy and stainless steel—tubing, bars, structurals, plates, sheets—aluminum, industrial plastics, metalworking machinery, etc.

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FACTORY
MANAGEMENT AND MAINTENANCE
...PRESS TIME REPORT • SEPTEMBER 1958

Looking Ahead in Business

Business is pulling out of the recession at a faster clip than was expected a few months ago. Even the bears concede the recovery is well under way.

Factory production spurted to 136 in July—the third two-point jump in a row. It included all 24 indexes in the FRB index from steel to textiles. With a little luck (and some help from new autos) output could approach the 147 range by end of '58. This was the pre-recession peak 'way back in late '56.

Middle East tension may add the little push needed to send industrial production into new ground in '59.

Key economic fact about Middle East events is not any huge new demand for goods and services—neither military buying nor consumer scare buying of the Korean variety. But the crisis does strengthen trends now under way. Business will move faster to rebuild depleted inventories. And the Department of Defense will keep new orders for military goods on the sharply rising schedule of the past few months.

•

With the upturn here, economists are toting up the '58 recession score. By most yardsticks—GNP, production, unemployment, capital spending (still declining)—this year's slide was deeper than in '53 and '49. But consumer income has fared better.

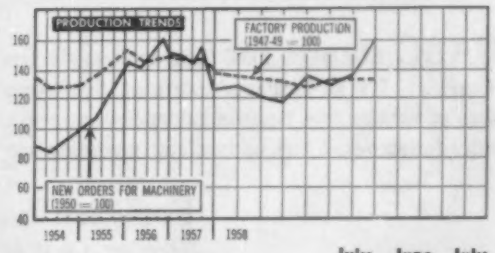
Even so, there's a squeeze on the durable goods market because consumers are saving more, installment buying has been trimmed, and rising prices for food, rent, and services have siphoned off money from the postponable big items. Outlook for the next six months: lower food prices, rising wages and salaries, more new credit, a surge in consumer buying.

•

Unlike personal income, profits have gone through the wringer in '58. But dividends have stayed at pre-recession levels. Result: First-quarter retained earnings were only $3-billion (annual rate). You have to go back to '40 to find net profits so low.

The profits slide halted in the second quarter. But earnings still make sorry reading. Against '57 autos are off 60%, steel 44%, oil 36%, chemicals 30% The gainers: food, drugs, tobaccos, utilities.

FACTORY FIGURES OF THE MONTH



Indicator	July 1958	June 1958	July 1957
New Orders for Machinery (exc. elec.)[1]	162.0[p]	138.0	165.0
Contracts for Industrial Construction[2]	91.0	79.0[r]	151.0
Factory Production[3]	136.0[p]	134.0[r]	147.0
Consumers' Prices (cost of living)[4]	123.6[e]	123.7	120.8
Industrial Prices (materials, supplies)[4]	125.7	125.3	125.7
Manufacturing Employment (millions)[4]	15.2	15.2	16.7
Total Employment (millions)[5]	65.2	65.0	67.2
Unemployment (millions)[5]	5.3	5.4	3.0

[p] = preliminary [r] = revised [e] = estimate

Sources: 1. McGraw-Hill Dept. of Economics (1950 = 100); 2. Engineering News-Record (1950 = 100); 3. U. S. Federal Reserve Board (1947-49 = 100); 4. U. S. Dept. of Labor, Bureau of Labor Statistics (1947-49 = 100); 5. U. S. Dept. of Commerce, Bureau of the Census.

Inflation also rears its head as one problem of the recovery. It's not the familiar postwar type of recovery—too much money chasing too little goods. It's too much investment money chasing too few stocks.

Most investors just don't want to hold onto cash or fixed-income securities. With large government deficits, wage hikes, international tension, and recession-proof prices, Wall Street sees continuous inflation over the long pull. The demand for stocks as a hedge against inflation has sent stock averages far above the levels justified by current earnings, dividends, and the yield on bonds.

•

Such speculation can spell trouble if it gets out of hand. This is the thinking of the Federal Reserve, which recently raised the margin for buying stocks from 50 to 70%. That's also why it has tightened credit a bit. The problem is how to do this without choking off recovery and making it hard for the Treasury to finance the deficit.

Ideas of the Month

(For more information, circle item numbers on Reader Service Card next to back cover)

UABC stands for "universal angle bus conductor" (*Aluminum Co. of America*). It's an L-shaped extrusion that promises savings for users of smaller sizes of tubular bus. Built-in center-line grooves on all four surfaces make drilling holes for standard lugs or insulator mounting a cinch. **(311)**

For yard hauls there's the handy-dandy Cub Lo-Boy tractor (*International Harvester Co.*). Just the ticket for light utility work like mowing, landscaping, grading, or what-have-you. Estimated horsepower, 12.8. **(312)**

Line striper (*H-B Mfg. Co.*) paints parking lines, safety lanes, as fast as you can walk. Weighs only 4½ lb. Single moving part. **(313)**

Every safety department library should own the new edition of "Industrial Hygiene and Toxicology" (*General Motors Corp.*). Available to people in industry responsible for anticipating and recognizing potentially harmful situations and applying engineering controls. 907 pages. **(314)**

Now you can repair roofs when they're wet or covered with melting snow—or even in a driving rainstorm. With Damp-Dek (*The Monroe Co.*). Two kinds: liquid (a roof coating); plastic (a patching cement). **(315)**

Nevastane and Vetostane (*Keystone Lubricating Co.*) are sure to delight the food and beverage folks—because they lubricate good like a lubricant should. Also they're odorless, tasteless, colorless. **(316)**

You'll like Lebanex (*Cascades Plywood*) if you're looking for a panel material for table tops, bench tops, shelving, partitions. **(317)**

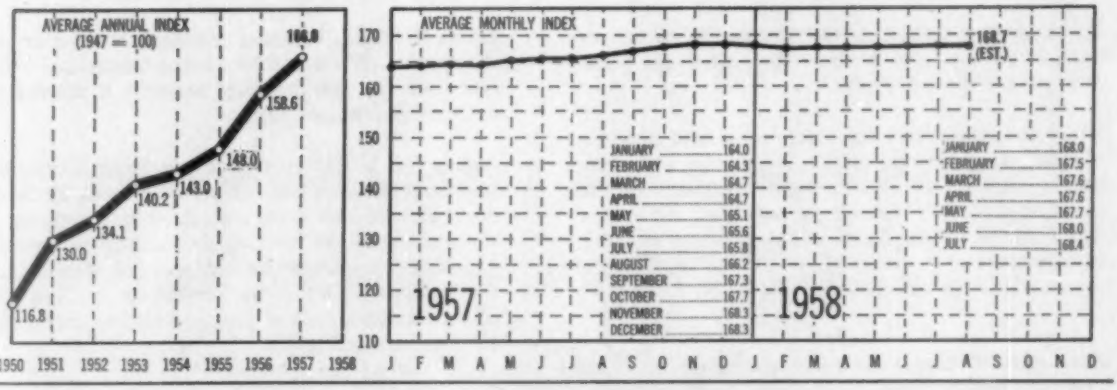
Scotch-Tred non-slip floor covering (*Minnesota Mining & Mfg. Co.*) can be applied in minutes—on walks and stairs, in locker rooms and cafeteria kitchens —wherever there's danger of falling and slipping. Just strip back-liner from pressure-sensitive adhesive; press to clean, dry surface. **(318)**

"100 Ways to Cut Material Handling Costs" is a free booklet (*Manpower, Inc.*) that will serve as a checklist for anyone who wants to go and do likewise. Might even put an idea or two in his cost-cutting head. **(319)**

More Ideas of the Month on pages 130 and 131

FACTORY
MANAGEMENT AND MAINTENANCE
. . . PRESS TIME REPORT • SEPTEMBER 1958

Cost Index of Plant Maintenance



Cost Index Hits New High

Costs now climbing at speedier rate, but rise will be less than in '56 and '57.

FACTORY'S COST INDEX reached an all-time high in July. Costs fell from December through February, inched up during late winter and spring, and have been climbing more steeply this summer. A steady rise seems certain for the balance of the year.

However, factory costs are not likely to rise as much this year as in 1956 and 1957. Industrial capacity is now more than ample. And expenditures on new plant and equipment are still drifting downward. A generally higher-than-optimum operating rate and heavy capital spending were major causes of inflation in 1956-57.

The fall in materials prices has ended. They declined almost 2% in the first half but reversed direction from June to July. And the recent steel price hike may work its way through the economy in the form of higher prices on fabricated items for several months.

Labor costs, as measured by the FACTORY Index, rose almost 1% in the first half. They will continue upward for the rest of the year. Nearly 2-million union workers will receive automatic wage raises guaranteed by their contracts in the remainder of 1958. In addition, over half a million auto workers, still without a contract, will probably win substantial pay boosts before October.

Cost of living adjustments tied to the Consumer Price Index, however, will exert less upward pressure on wages. Declining food prices should keep the CPI on a plateau for the rest of the year.

	AVERAGE 1957	JULY (Preliminary)	JUNE (Revised)
Building and Facilities Index	158.9	168.1	168.4
Materials	140.6	137.5	137.4
Brick	147.8	148.5	148.6
Elec. fixtures	128.0	128.9	128.9
Elec. switches, boards, fuses	175.7	182.6	182.6
Elec. wire, copper	136.6	122.1	118.6
Glass	152.6	152.5	152.5
Gutters, spouts, ducts	169.4	170.1	170.1
Gypsum products	134.5	140.8	140.8
Heating equipment	128.2	127.4	127.3
Lumber	126.7	123.5	123.6
Millwork	147.1	145.9	145.6
Paint	128.1	130.0	130.0
Pipe, cast iron	165.8	170.4	170.4
Pipe, steel	188.1	190.1	190.1
Pipe & tubing, copper	156.0	143.3	142.8
Roofing	129.8	112.4	112.4
Sanitary fixtures	151.4	140.6	142.8
Sash, metal frame trim	145.7	147.2	148.0
Solder	121.2	114.7	115.7
Steel, structural	222.0	227.7	227.7
Tanks, steel	138.3	137.5	138.2
Valves & fittings	159.9	161.2	161.1
Wire mesh	166.9	162.9	160.8
Labor	167.7	175.2	174.0
Carpenters	154.6	163.1	160.6
Electricians	174.5	184.6	184.0
Painters	174.0	178.0	177.4
Equipment Index	169.9	171.8	171.8
Materials	167.7	168.8	168.7
Abrasives	154.1	160.4	160.4
Alloys, non-ferrous	127.2	115.2	116.0
Bars & plate, steel	214.8	220.9	220.9
Bearings	166.2	160.5	160.5
Belting	150.9	150.0	150.0
Bolts, nuts & screws	222.9	230.6	230.6
Chain	177.6	184.0	184.0
Controls (electrical)	175.7	182.6	182.6
Gear-reduction units	180.4	181.7	181.7
Hand tools, mechanics	185.1	192.3	192.3
Lubricants	87.8	80.1	81.1
Motors	143.5	148.1	148.1
Non-ferrous metals	133.3	116.3	116.3
Precision tools	150.2	153.2	153.2
Pumps	177.2	183.7	183.7
Tools, cutting	162.3	163.2	161.1
Valves & fittings	159.9	161.2	161.1
Labor	171.5	174.0	173.6
All mfg. labor	167.5	172.2	171.4
Machine tool labor	175.4	175.8	175.8
FACTORY'S COST INDEX	168.8	168.4	168.8

FACTORY
MANAGEMENT AND MAINTENANCE
. . . PRESS TIME REPORT • SEPTEMBER 1958

Looking Ahead in Labor

Teamster racketeering is splitting the labor movement at the top. But it won't show up at the plant gate or the loading platform.

That's the good news employers may read into the widening gap between AFL-CIO unions and their former affiliate, the International Brotherhood of Teamsters. Despite new steps to isolate the union that James R. Hoffa heads up, local union working arrangements will continue as always. Employers need not look for new jurisdictional wars.

•

The top-level mutual aid pacts are being dissolved. Joint organizing drives—such as the Teamster-Office Employees Union white-collar deal—are being slowed down. AFL-CIO unions are withdrawing international funds from joint ventures with the Teamsters. Almost a dozen deals are to be broken off.

This, too, is good news for management. It means that projected white-collar, auto shop, and construction organizing programs—among others—will be slowed down. New joint AFL-CIO Teamster ventures that require a start from the upper union levels will wait until the split is mended.

•

The new union crackdown on the Teamsters is the plan of AFL-CIO President George Meany, who forced the Teamsters' ouster from the federation last December. His order: No pacts that give aid and comfort to the trucking union.

The Meany plan rejects the Teamster leadership. But it does not involve the rank and file of any union. It recognizes the well-known and long-standing cooperation in the field, and there will be no attempts to scuttle these practices.

There are reasons for this no-scuttling policy:

• **The Teamsters are in strategic position, as carriers, to help or cripple another union's strike.**

• **Meany is practical. He knows that orders from on high aren't going to sit well in the field if they hurt the union members' security by opening a break with the powerful Teamsters.**

James R. Hoffa, Teamster president, is the source of the trouble. When the McClellan Committee called him back for new hearings recently, it revived the anti-corruption campaign.

Facing the McClellan-run Senate Select Committee on the misdeeds of labor and management, Hoffa did not admit he had done a single thing wrong in his stewardship of the trucking union. But the committee piled up cumulative evidence of questionable leadership by Hoffa—in his choice of Teamster officers and in his use of Teamster funds—that makes a strong case against him.

•

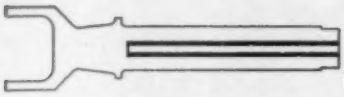
Here are some examples of the charges:

• **Detroit laundry employers admitted a $17,500 payoff to a Holtzman-Bushkin labor relations firm to end a Teamster strike threat.** Hoffa says he borrowed $10,000 from the firm with no security, no interest, and no records on the loans. Holtzman is deceased. Bushkin took the fifth amendment when questioned by the committee. Hoffa denied receiving any payoffs. The employers didn't know for sure—but they suspected him, because the dispute was settled after the payoff and his intervention in negotiations.

• **Hoffa's close friend, Ewen Bert Brennan, is Number 2 official in Detroit. He shares in joint ventures with Hoffa. They once owned a prizefighter who was put on the Teamster Central States welfare fund at $75 a week while in training. He did no work for the fund.** Brennan also owns stables and makes racetrack bets for Hoffa, who claimed $60,000 in winnings from 1948 to 1956. Hoffa, asked to explain the fighter's being on the union payroll and his betting methods, said this had all been handled by Brennan. Brennan, when questioned about these matters, took the fifth amendment.

• **Other matters: Hoffa's union paid four officers $181,000 in salaries while in jail for extorting money from employers.** Hoffa describes this as a reward for long services. He promoted a $1.2-million loan to a department store owner who gave him expensive gifts. He also received a fur piece from the owner, paying $500. No records. Hoffa handles all transactions in cash. And there's much more.

SEE LABOR RELATIONS NEWS, PAGE 186



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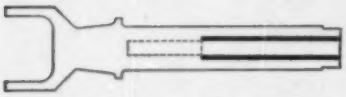

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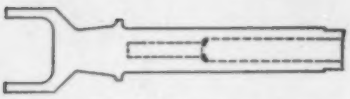

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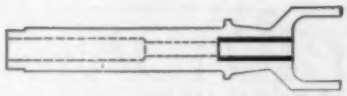
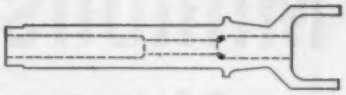
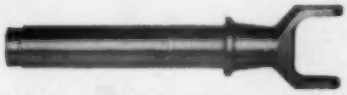
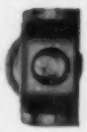


4. Reverse part, solid bore—feed 5¾" per minute.



5. Form radius—feed 5¾" per minute.





6. Part finished accurate to ± .001" on length and concentricity, 25 to 30 micro-inches on finish! Part is forging, length 14⅛", 4130 steel, Rockwell 39 to 43-C.

This horizontal pin machined

8 TIMES FASTER . . .

on the Rapid Borer

Formerly, this aircraft part was rough drilled, reamed, radius formed, ground and honed. Operation called for turret lathe, grinder and honing machine. Even with experienced operators, incidence of spoilage was high because of precision requirements.

On the LeBlond-Carlstedt Rapid Borer, there is only one set-up. Part is completed, *finish bored* in 5 simple operations. Cycling is automatic. Workpiece spoilage is down. Operation is so simple that unskilled operators are quickly trained. Currently 2 different sizes are being produced in lots of 300 to 400.

LeBlond-Carlstedt Rapid Borers will solid bore, trepan or counterbore holes 3 to 8 times faster than by the conventional D-bit method! Hole capacity from 5/16" to 4¼" diameter. Handles symmetrical work—round, square, octagonal, tapered or stepped—wide variety of hole diameters and depths, work sizes. Available in three sizes, No. 15, No. 30 and No. 60.

Tell us about the holes you'd like to produce faster. Large holes or small. If the Rapid Borer can handle the job, you'll produce them faster than ever before. Write for Bulletin LC 301H.

LeBlond customer:

Peter J. Salmon Co., Glenside, Pa. Contract machining, specialists in high precision work. Semi-production machining, drilling, honing.

According to Peter J. Salmon, Owner, "*No machinery investment we've ever made has reduced our immediate costs as dramatically as the LeBlond-Carlstedt Rapid Borer. Actually, it competes cost-wise with any other holemaking method for holes as shallow as one inch. On longer holes there's no comparison! Not with the Rapid Borer, which can feed over 30" per minute!*"

THE R. K. LeBLOND MACHINE TOOL COMPANY

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World's Largest Builder of a Complete Line of Lathes for more than 71 years

Millions of operating dollars are waiting to be saved

(by plant managers who adopt organized lubrication)

Concept of Organized Lubrication to save cash in 5 areas of plant operation is proving to be a most fertile field for plant-wide cost control. Two reports now available from Texaco on opportunities, methods, case histories.

"Millions of dollars have already been saved in the operating costs of plants where management has recognized the importance of lubrication and has organized planned lubrication programs. Millions of dollars are waiting to be saved in plants where management has not yet become aware of the benefits of organized lubrication."

The entire July, 1958, issue of *Lubrication* magazine is devoted to "Organized Plant Lubrication." The statement above summarizes the issue's findings.

In effect, this and other writings on the subject reflect the fact that here is a relatively new and certainly fertile field for real cost savings in plant operations.

There's enough evidence in to cause excitement among the experts. Among the experts are the men who are putting Organized Lubrication to work—the plant managers and their team of engineers.

For, in assuming the large burden of satisfying the corporate measure of profit and loss on their units, plant managers have been quick to adopt new concepts and practices that result in plant-wide savings, such as planned overhaul, professionalized purchasing and organized quality control.

Most of these have been cost-controlling programs. So is Organized Lubrication. From the evidence in so far, this can prove to be one of the most fertile of the new plant managing practices.

Why? *Because Organized Lubrication can create cash savings in five ways; in inventory, production, downtime, maintenance and equipment life. Once adopted as plant practice, Organized Lubrication is placed in harness by plant engineers, production superintendents, maintenance superintendents, and purchasing agents.*

Let's acknowledge now that lubricants alone, no matter how excellent, are not the secret; rather, it is the setting of goals, the organizing of methods, and the expertness of men who can combine a knowledge of this new opportunity with an understanding of plant practices and lubrication.

In plants throughout the country Texaco's planning book has been studied and put to use. Some large corporations have adopted its recommendations on a staff level, or have set up committees to study the subject. Many plant units report savings from 10 to 100 times the cost of the lubricant used!

If you are a member of a plant operating group, or if you are concerned with cost control in many plants, you will find this subject well worth an introductory 10 minutes or so.

SEND FOR TEXACO'S NEW GUIDE FOR ORGANIZING LUBRICATION

Limited quantity available; please attach coupon to your company letterhead

The Texas Company
Dept. F60
135 East 42nd St.
New York 17, N. Y.

Please send me Management Practices that Control Costs via Organized Lubrication.

☐ I would also like the July issue of *Lubrication* Magazine (published by Texaco).

Name_____ Title_____

"PLAN '59— Modernize Now for Growth and Profits"

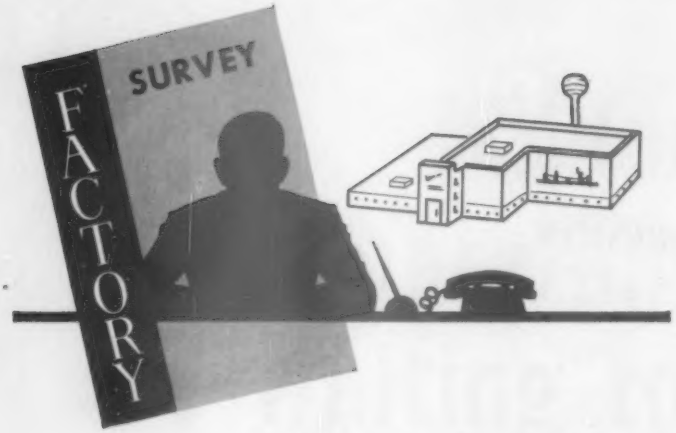
THE WORDS ABOVE are a slogan that you'll be seeing often in the next two or three months in FACTORY and in other McGraw-Hill magazines. That's because all of our magazines are taking part in "Plan '59." Each is developing the theme—"Modernize now for growth and profits"—so as to serve most helpfully the needs of its specific audience. The result of this coordinated company-wide effort will appear in print in the various magazines in October and November.

We FACTORY editors are in this program right up to our necks. We're planning to devote over 50 pages in our November issue to the theme. And, to reassure those of you who know that we often run articles on modernization, we're *not* just throwing a few of them together to make a theme issue. On the contrary, we're developing what really amounts to a carefully researched and edited guidebook on why and how to organize and systematize modernization activity. We are going to call it our "Guide to Managed Modernization."

Why do we bother to tell you this? Simply because we are convinced that this is one of the most important and exciting projects FACTORY has ever engaged in. Here's why we believe so:

- **It's timely.** We know there's a big economic upsurge ahead. And we know that now is the best opportunity most companies have had in years to get ready for that upsurge. Prices are favorable, deliveries on equipment and materials are good, and engineering and consulting services, less pressed than usual, can give your work closer attention.
- **It's forward-looking.** By this we mean that it fits the changing needs of industry today and reflects the pattern of the next few years. Surveys of capital spending confirm that a shift is now under way, moving emphasis from new plant construction to modernization of existing facilities and equipment. By 1960, our Economics Department tells us, two-thirds of the capital investment dollars spent by manufacturing plants will go for improvement of *existing* capacity, and only one-third for creation of new capacity.
- **It's good for the economy.** In fact, we suspect that merely getting ready for the next boom could well be one of the most potent forces in speeding up its arrival. Please don't misunderstand us on this. We think it's stupid to go out and buy things for your plant just to help somebody else in general. You're paid to help your plant in particular. Only when you do that do you really help the economy.
- **It's badly needed.** We visit hundreds of plants a year. We can see the need just as we look around us, in many instances. But, of course, there are many things we can't see and our friends in plants tell us about them. When we add up what we see and what we hear, we are convinced that great opportunities for modernization are available to virtually every manufacturing plant in the country—opportunities for lower costs, better quality, smoother operations. We have just finished a special series of visits to over 50 plants in developing our Guide to Managed Modernization. Here we have probed deep into the need for modernization. Everything we have seen and heard confirms our conviction that the need is great.
- **It's smart to do.** Here is where you, personally, come in. The plant operating management man who sticks with old hit-or-miss methods in planning and following through on modernization projects is missing the boat. He is failing to take advantage of the best in today's management techniques, failing to use the most efficient tools of management. In a word, he is not using modern techniques for modernization activities. There is no excuse for this because the knowledge is available. What we plan to do is to sum it up in a package that anyone can use. What we hope will come out of it is a more systematic and intelligent approach to spending your money.

What could be smarter than that?



Maintenance Management Practices In Industry Today

On the next 18 pages you'll find a report of this detailed and searching nation-wide survey—"must" reading for every plant management executive who wants to keep abreast of today's practices and the trends that are shaping tomorrow's. This is the second of two reports on FACTORY's just-completed survey. The first (in August issue) covered "Electrical Management and Maintenance Practices Today." For a special article on the new survey-analysis technique (used here for the first time) see August issue, page 138.

Where Industry Stands Today in

INDUSTRY STANDS BETTER than ever. But industry's maintenance is still not good enough to meet the challenge of the high standards being demanded by the onrushing missile age. There are a number of areas where maintenance management is falling short of what's desirable:

. . . *Size of the maintenance force.* In relation to both square footage and connected motor load it appears inadequate in many plants—and too big in others.

. . . *Clerical help.* Maintenance has none in 30% of the plants, is starved for it in many more.

. . . *Place of maintenance in the plant organization.* It is so often confused by a welter of titles and unclear relationships as to suggest that top management is still unconvinced of the importance of the contribution maintenance can make to plant efficiency.

. . . *Maintenance cost records.* They are woefully inadequate in a substantial majority of plants.

. . . *New analysis techniques.* They are being used by only a small minority of plants, although a fair proportion seem to think they are using them.

. . . *Maintenance staff and supervisory personnel.* They are seriously underpaid (in relation to the pay of craftsmen) in at least one plant in four.

. . . *Updated facilities.* Older plants lag badly.

. . . *The finest maintenance job.* You'll find it in heavy process plants. Others please copy.

These are conclusions based on the 359 plants reporting in the survey (30 returns were received too late to

By CARROLL W. BOYCE, Manager, Features and Departments; and CARL G. WYDER, Editor, Plant Maintenance and Engineering, FACTORY

TYPES AND SIZES OF PLANTS RESPONDING TO THE SURVEY

NUMBER OF PRODUCTION EMPLOYEES	50–250 (Median This Group = 152)	251–500 (Median This Group = 356)	501–1250 (Median This Group = 800)	1251–22,800 (Median This Group = 2409)	TOTAL, ALL SIZES OF PLANT
TYPES OF PLANT	RESPONDENTS Plants / Employees All Types	RESPONDENTS Plants / Employees All Types	RESPONDENTS Plants / Employees All Types	RESPONDENTS Plants / Employees All Types	RESPONDENTS Plants / Employees All Types
1. HEAVY PROCESS Heavy equipment, process type, with high cost of interruption	17 / 6,500	13 / 10,300	17 / 30,800	9 / 33,500	56 / 81,100
2. LIGHT PROCESS Light equipment, process-type, with moderate-to-high cost of interruption	24 / 6,000	27 / 15,300	16 / 21,400	12 / 39,700	79 / 82,400
3. HEAVY FABRICATION Heavy equipment, fabrication-and-assembly type, with low-to-moderate cost of interruption	11 / 2,400	13 / 8,900	35 / 48,400	35 / 325,400	94 / 385,100
4. LIGHT FABRICATION Light equipment, fabrication-and-assembly type, low cost of interruption	27 / 7,000	27 / 16,200	24 / 33,100	15 / 72,600	93 / 128,900
5. BENCHWORK Very light equipment, benchwork-type, very low cost of interruption	4 / 1,600	4 / 3,300	16 / 25,400	13 / 67,000	37 / 97,300
TOTAL ALL TYPES OF PLANTS	83 / 23,500	84 / 54,000	108 / 159,100	84 / 538,200	359 / 774,800

Definitions of "type of plant" in FACTORY's new plant-classification system are stated above in the left column. The editors believe this system is far more meaningful than the Standard Industrial Classification as far as maintenance and electrical problems are concerned. For a detailed analysis of this new classification system—and a specific-product list of plants classified in each group—see August FACTORY, p. 138.

Maintenance Management

include in the electrical section last month). In all likelihood, this is a better picture than exists in industry generally. Here's why:

This survey is *not* a true statistical sample of U.S. industry. It is representative only of medium-to-large plants. The mailing was weighted toward larger plants, and the returns tend to concentrate even more heavily in this area. (Returns cover 1½% of all plants with 100 or more employees, 9% of units with 1000 or more.) In terms of the maintenance force, only 16% have 10 or fewer craftsmen; 40% have 11 to 50; 24% have 51 to 150; and 20% have more than 150 craftsmen.

Naturally, not all large plants are better plants, as regards maintenance management and practice. But at least two factors convince us our sample includes a higher-than-normal percentage of above-average plants: . . . *22% of the plants* have been built new within the past five years. Only 39% of them were built prior to World War II.

. . . *An even dozen* have been among winners of FACTORY's "Top Ten Plants" awards in the last five years —and as many more were red-hot contenders.

So, while the survey includes plants that run the gamut from worst to best in maintenance practice, there's almost surely a disproportionate representation of good-to-very-good practice.

Effect of the recession on survey replies was eliminated as far as possible by a note accompanying the questionnaire. We asked respondents to report normal 1957 (pre-recession) figures on employment, maintenance staff, etc. Naturally FACTORY cannot certify that this was done in every return.

Now, for a detailed analysis of the replies to the survey questions, turn the page

PLANT MAINTENANCE AND ENGINEERING EMPLOYEES PER 100 PRODUCTION WORKERS

CLASS OF PLANT	Min.	10th Percentile	Median—50th Percentile	90th Percentile	Max.
1 HEAVY PROCESS	10	20	50	140	220
2 LIGHT PROCESS	5	7	20	40	50
3 HEAVY FABRICATION	2	7	10	25	50
4 LIGHT FABRICATION	3	5	10	20	80
5 BENCHWORK	2	4	6	15	20
ALL PLANTS	3	6	15	60	220

TOTAL NUMBER OF MAINTENANCE CRAFTSMEN PER PLANT

CLASS OF PLANT	Min.	10th Percentile	Median—50th Percentile	90th Percentile	Max.
1 HEAVY PROCESS	12	40	166	576	2437
2 LIGHT PROCESS	3	8	37	169	460
3 HEAVY FABRICATION	4	12	62	489	1065
4 LIGHT FABRICATION	2	6	20	117	490
5 BENCHWORK	4	9	26	174	404
ALL PLANTS	2	8	44	310	2437

How Industry Sizes Its

NO ONE of the five key ratios shown on these two pages is a reliable guide to sizing your maintenance force. As a quick inspection will show, the variations within each ratio (even within a given class of plant) are great. Exclude the 10% of plants at the top and bottom extreme (that's what the 90th and 10th percentile points do), and you still have a big spread.

Quite often, FACTORY editors are asked for an average. Let's take as an example the number of craftsmen in heavy fabricating plants. The average is 172 (not shown in table). But the figures run all the way from 4 to 1065. Actually, there are only 27% of the heavy fabricating plants with as many as this "average" of 172. In large part, this is our reason for stating *median* values rather than averages. In heavy fabricating, 50% of the plants have fewer than the median number of 62; and 50% have more than 62.

Looking at it another way, you can say that the median is the number of craftsmen in the "average plant" or "typical plant." But it's not safe to assume that yours is an average plant—at least, not without some checking. That's where the other tables will help. If you are in the same relative position on the percentile scale most of the time, you want to start asking *why* when you suddenly turn up in a very different relative position.

Two of the tables don't relate to number of personnel. Consider for a minute the table of horsepower per 1000 square feet of manufacturing area. If your plant has a relatively high concentration of motor load, then you'd expect to be relatively lower in the ratio of square feet per craftsman and relatively higher in the ratio of horsepower per craftsman. A low concentration of horsepower per 1000 square feet would give you the reverse situation.

Horsepower per craftsman	Age of plant in years 0-5	6-17	18-plus
	Per cent of plants		
Up to 49	18	16	11
50-99	23	31	27
100-149	28	17	29
150-249	20	24	17
250 or more	11	12	16

Square feet per craftsman	Age of plant in years 0-5	6-17	18-plus
	Per cent of plants		
Under 3000	14	20	15
3000-4999	14	15	16
5000-6999	14	12	14
7000-9999	24	19	18
10,000 or more	30	27	33
Open air	4	7	4

Similarly, number of shifts operated will have an effect—particularly on a ratio to number of production workers. If yours is a 3-shift operation in a fabricating plant, you'll want to check the ratios for the predominantly 3-shift process-type plants, and so on.

If you have had the feeling that the age of a plant has an effect on the size of the maintenance force re-

THOUSAND SQUARE FEET OF MANUFACTURING AREA PER MAINTENANCE CRAFTSMAN*

CLASS OF PLANT	Min.	10th Percentile	Median–50th Percentile	90th Percentile	Max.
1 HEAVY PROCESS	0.2	1.1	2.3	9.0	18.0
2 LIGHT PROCESS	0.9	1.8	5.2	14.0	45.0
3 HEAVY FABRICATION	0.9	2.6	7.2	20.0	62.0
4 LIGHT FABRICATION	0.2	3.7	10.0	24.0	36.0
5 BENCHWORK	1.5	3.6	7.9	17.0	47.0
ALL PLANTS	0.2	2.0	7.5	20.0	62.0

*17 "open air" process plants omitted from tabulation.

HORSEPOWER OF CONNECTED MOTOR LOAD PER MAINTENANCE CRAFTSMAN

CLASS OF PLANT	Min.	10th Percentile	Median–50th Percentile	90th Percentile	Max.
1 HEAVY PROCESS	30	60	120	410	820
2 LIGHT PROCESS	20	30	70	230	520
3 HEAVY FABRICATION	10	50	140	260	670
4 LIGHT FABRICATION	10	40	120	280	810
5 BENCHWORK	10	20	110	300	540
ALL PLANTS	10	40	110	270	820

HORSEPOWER OF CONNECTED MOTOR LOAD PER 1000 SQUARE FEET OF MANUFACTURING AREA*

CLASS OF PLANT	Min.	10th Percentile	Median–50th Percentile	90th Percentile	Max.
1 HEAVY PROCESS	11	16	57	120	290
2 LIGHT PROCESS	1.5	4.1	17	48	64
3 HEAVY FABRICATION	2.5	4.9	19	53	120
4 LIGHT FABRICATION	1.2	4.0	13	29	50
5 BENCHWORK	2.0	33	10	38	95
ALL PLANTS	1.2	5.0	18	48	290

*17 "open air" process plants omitted from tabulation.

Maintenance Force

quired, take a look at the tables in the column directly at left. It doesn't work out that way.

This could mean that, contrary to popular belief, a new plant is not easier to maintain. We doubt this interpretation. Rather, we suspect that the explanation for the seeming contradiction lies in these factors:

. . . *New plants are staffed* on the basis of old concepts and "proved" ratios developed in older plants.

. . . *Management is demanding* a higher quality of maintenance than it has been willing to accept in older plants in order to protect its investment in the new plant. And higher level maintenance—in general—will take more men per square foot and per horsepower.

Actually these two factors complement each other nicely. The "old plant" ratios provide the "excess" staffing required to achieve high-level maintenance.

A word of warning is in order regarding figures based on square footage. Fifteen heavy process and two light process plants identified themselves as "open air" plants. These were excluded from the tabulations on area. But a number of other plants in these two classes indicated enclosed manufacturing areas so small as to lead us to believe that a substantial proportion of their operations are not under roof. Lacking specific information on the point, these plants were included in the tabulations.

The result is a possible *understatement* of square feet per craftsman, and a possible *overstatement* of horsepower per square foot for the maximums and 90th percentile points in the heavy process group, and perhaps in the light process group, too.

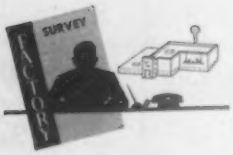
NUMBER OF SHIFTS FOR NORMAL PRODUCTION OPERATIONS

CLASS OF PLANT	1 Shift*	2 Shifts*	3 Shifts, 5 days	3 Shifts, 6 days	3 Shifts, 7 days
	Percent of Plants				
1 HEAVY PROCESS	2	4	15	6	73
2 LIGHT PROCESS	22	38	28	4	7
3 HEAVY FABRICATION	26	60	12	2	—
4 LIGHT FABRICATION	33	56	9	2	—
5 BENCHWORK	65	32	3	—	—
ALL PLANTS	27	42	14	3	14

*A few of these plants (less than 10% in any class, less than 5% overall) operate either 6 or 7 days. The remainder are on a 5-day schedule.

19 TYPES OF MAINTENANCE WORKERS — HOW MANY OF

GROUPS Figures do not add to exactly 359 since not every plant answered every part	Heads of Plant Engineering and Maintenance Departments	Staff Engineers, Facilities Engineers, and Project Engineers	Preventive Maintenance Engineers	Industrial Engineers	Job Cost Estimators	Work Measurement Analysts or Checkers	Work Planners — Central Office and/or Field	Draftsmen
PLANTS WITH NONE	7	99	299	260	289	317	283	163
PLANTS WITH ONE OR MORE	349	257	57	96	67	39	73	192
MINIMUM	1	1	1	1	1	1	1	1
10TH PERCENTILE	1	1	1	1	1	1	1	1
MEDIAN	1	4	1	2	2	1	2	2
90TH PERCENTILE	3	18	3	10+	6	4	10	16
MAXIMUM	10+	100+	10+	10+	10+	10+	18	49



How Industry Is Managing Its

PERHAPS THE BIGGEST single headache of the maintenance executive is to convince higher management when he hasn't enough manpower. Or when he thinks a particular function should be added to the maintenance department.

The chart at the top of these two pages may provide a "clincher" in either of those situations. Or it might knock an otherwise sound argument right into a cocked hat. Because the figures are merely a statistical picture of what is being done. They don't necessarily bear any relation to what should be done in a specific instance.

There's one thing you will want to watch out for in interpreting the figures. The minimums, maximums, and percentile points (see page 92 for explanation of these terms) are derived independently for each category of worker. In other words, not all the maximums come from one plant, all the medians from a second, and so on. In fact, the plant with a maximum number of clerks might not have any preventive maintenance engineers, or *vice versa.*

Actually the top line of the chart, in which we report the number of plants (out of 359 in each case) in which there are no workers in a particular category, is perhaps the single most significant key to organizational competency. That's particularly true in the categories essential to proper management of the maintenance function.

For example, 114 plants—over 30% of the total—do not have clerks in the maintenance department: These plants are asking the maintenance head to manage his complex function without any clerical help. So if the clerical work is done at all, it's done at a supervisory rate. And if it doesn't get done, the maintenance head just cannot be a good manager.

We don't consider it a particularly significant item, but many people ask about the number of janitors (cleaning and sanitation personnel). For plants that have them assigned to the maintenance department, here's the breakdown by size of manufacturing area:

Number of cleaning and sanitation employees	Under 250,000 sq. ft.	251,- to 750,000 sq. ft.	Over 750,000 sq. ft.
Minimum	1	2	1
10th percentile	2	4	6
Median—50th percentile	5	11	40
90th percentile	17	40	150
Maximum	50	117	266

EACH YOU'LL FIND IN EACH OF 359 PLANTS

Dispatchers	Inspectors	Maintenance Zone & Shop Heads, General Craft Foremen, and Craft Supervisors or Foremen	Chief Clerks, and Clerks — Central Office and /or Field	Craftsmen — Maintenance and/or Construction	Maintenance Stores and Tool Cribs	Parts Delivery Men	Grounds Keepers, and Laborers	Cleaning and Sanitation Personnel	Power Plant Personnel	All Others
302	**309**	**49**	**114**	**5**	**128**	**310**	**113**	**106**	**116**	**254**
54	47	300	242	351	227	46	242	249	240	101
1	1	1	1	2	1	1	1	1	1	1
1	1	1	1	8	1	1	1	2	3	1
1	3	5	2	44	2	2	7	12	8	8
4	20	33	13	310	11	4	39	60	36	70
10+	70	238	59	2437	100+	10+	100+	266	100+	100+

Maintenance Manpower Today

How maintenance reports topside

Because industry uses so many different titles—and also often uses the same title to describe vastly different jobs—trying to find any definite pattern with respect to titles in the maintenance organization turns out to be a near impossibility.

The survey questionnaire asked for the titles of the men who are directly responsible for each of the following activities (also title of man to whom each reports):

. . . *Design of buildings and facilities,* including heating, ventilating, lighting, and other plant services; plant utilities (electric, steam, gas, air, etc.); and grounds.

. . . *Maintenance of buildings and facilities.*

. . . *Design of production equipment,* including machinery and services (toolcribs, die shops, etc.)

. . . *Maintenance of production equipment.*

While titles themselves don't make clear the interrelationships that exist in a plant, the physical form of FACTORY's questionnaire called for having them entered in what amounted almost to an organization chart. From this, we were able to make an analysis that indicates these relationships between design and maintenance at various levels:

. . . *46% of the plants have the same man* directly responsible for both design and maintenance functions.

. . . *18% have the man* directly responsible for maintenance reporting to the man directly responsible for design.

. . . *12% have different men* directly responsible for design and for maintenance, but both report to same man.

. . . *24% have different men* directly responsible for design and for maintenance, and each reports to a still different man.

Additionally, in 61% of the plants it was possible to determine whether maintenance reports to plant management through production, or to plant management directly. (Remaining 39% either provided insufficient data, or the titles used made it impossible to distinguish between production and general plant management.)

. . . *16% of the plants are organized* so that maintenance (either directly or through design, depending on the particular set-up—see above) reports to production.

. . . *45% have maintenance* (either directly or through design) reporting to general plant management or to higher management without going through production.

Turn the page

Managing Maintenance Manpower... *Begins on page 94*

Some companies responding to the survey had only one title for all direct responsibilities. Others had as many as four. Including the minor variations, there were probably 300 to 400 different titles—obviously too many to tabulate.

To make analysis possible, we consolidated most of the titles into 15 descriptive categories. Among titles with "direct responsibility," this still left 20% that could not be classified—none of which appeared more than ½% of the time. Among these "other" titles were such as director of utilities, power house supervisor, head groundskeeper, stationary engineer, properties manager, technical service manager.

The "title" categories in the table below were arrived at by making the following consolidations:

... *Facilities Manager*—Includes director or superintendent of facilities, of services, of services and facilities, of engineering services.

... *Design Manager*—Includes director or supervisor of design, of planning and design, of machine design, of mechanical engineering.

... *Works Engineer*—Also chief engineer, director of engineering, resident engineer.

... *Plant Engineer*—Includes chief and assistant plant engineer; supervisor or manager of plant engineering, of plant engineering and maintenance.

... *Maintenance Superintendent*—Also manager, director, and supervisor of maintenance (where latter is clearly not a foreman), of buildings and maintenance, of maintenance and construction, of buildings and grounds; general foreman of maintenance.

... *Maintenance Engineer*—Also electrical, buildings, utilities, or preventive maintenance engineer.

... *Maintenance Foreman*—Also maintenance supervisor or section head (where clearly first-line); craft foreman; chief electrician; group leader.

... *Master Mechanic*—Includes supervisor of mechanical maintenance; machine shop foreman.

... *Manager of Manufacturing*—Also director; includes production manager; manufacturing superintendent.

... *Manager, Industrial Engineering*—Also director or supervisor; includes production, process, methods, manufacturing engineering.

... *Industrial Engineer*—Subordinate to above.

... *Tool Engineer*—Also director of tooling, supervisor of tool and die design.

... *Tooling Foreman*—Includes supervisor or foreman of tool crib; manager of maintenance stores.

WHO IS RESPONSIBLE FOR DESIGN AND MAINTENANCE OF...

Figures are percent of plants. Totals add to more than 100% since many plants gave more than one answer to each part. See text for explanation of categories of "titles."	...BUILDINGS, FACILITIES				...PRODUCTION EQUIPMENT			
	DESIGN		MAINTENANCE		DESIGN		MAINTENANCE	
	Is directly responsible	Is the superior of the man responsible	Is directly responsible	Is the superior of the man responsible	Is directly responsible	Is the superior of the man responsible	Is directly responsible	Is the superior of the man responsible
	%	%	%	%	%	%	%	%
Facilities Manager	2	5	2	4	1	4	1	3
Design Manager	6	1	—	—	5	1	—	—
Works Engineer	8	7	2	7	8	7	1	7
Plant Engineer	51	14	31	22	38	11	24	19
Maintenance Superintendent	11	1	35	8	6	*	28	8
Maintenance Engineer	1	—	3	1	*	*	4	*
Maintenance Foreman	2	—	19	1	2	*	15	*
Master Mechanic	2	*	3	2	6	1	13	2
SUBTOTAL	**83**	**28**	**95**	**45**	**66**	**24**	**86**	**39**
Manager of Manufacturing	—	4	—	4	2	5	1	6
Manager, Industrial Engineering	2	3	—	3	5	2	1	2
Industrial Engineer	1	*	—	*	6	2	2	1
Tool Engineer	*	—	—	—	8	*	3	1
Tooling Foreman	—	—	—	—	2	—	7	—
SUBTOTAL	**3**	**7**	**—**	**7**	**23**	**9**	**14**	**10**
Higher Management	1	23	—	11	—	22	—	11
General Plant Management	*	38	*	29	2	41	1	36
SUBTOTAL	**1**	**61**	*	**40**	**2**	**63**	**1**	**47**
ALL OTHER TITLES	**22**	**3**	**15**	**5**	**19**	**5**	**8**	**3**

*Less than 0.5%.

. . . *Higher Management*—President, vice president, general manager, division manager.

. . . *General Plant Management*—Includes plant, factory, works manager; plant or general superintendent.

This list does not include all the minor variations in each category. Specifically, an "assistant" or "assistant to" is always included with its respective title.

In the table at bottom of p. 96 the titles are grouped as "maintenance," "production," and "supervising management." Within each group the sequence follows what the survey indicates as the "most usual" hierarchical order. But that doesn't mean you won't sometimes find a facilities manager reporting to a maintenance superintendent, or a tool engineer to a tooling foreman. (The master mechanic is placed at bottom of the maintenance list purely for convenience. He's just as likely to fit into production. And he can appear at almost any level from top to near bottom.)

As an example of how thoroughly confusing it can be to try to draw conclusions about either functional responsibility or organizational rank from a title, take a look at "plant engineer." On a straight "popularity contest" basis this title turned up more often than any other. And no title in this category did not include the specific words "plant engineer."

In 65% of the plants a man with this title is involved with design of buildings and facilities—but in 51% he is the man directly responsible, and in 14% he is the immediate superior of the man directly responsible. When it comes to maintenance of buildings and facilities, however, in only 53% of plants is the plant engineer involved in any degree—presumably meaning that in 12% he has no involvement with maintenance.

One fact that emerges from the welter of confusion in titles is the small but growing trend toward the use of "executive" titles for a single top man who has overall responsibility for management of both the design and the maintenance functions for all facilities. Among the titles that usually fall in this classification are: manager of facilities, manager of plant services, director of works engineering, plant engineering and maintenance manager, chief plant and maintenance engineer, superintendent of services and facilities.

Training for maintenance

Industry isn't making much more than a half-hearted stab at training its personnel to meet the needs of increasing mechanization and new types of equipment. As the table (top right) indicates, only 31% of plants have any sort of continuing training program for their craftsmen. (Actually, there's reason to suspect that some and perhaps many of the plants that said "Yes" to this question have, in reality, nothing more than apprentice training.) The poor showing of the smaller-sized plants suggests either they won't face up to the problem of developing and updating competent craftsmen, or don't realize it exists. The heavy process plants are doing far and away the best job—probably because the nature of their operations leaves them no choice. They must train or die, and they know it.

Supervisor training programs are a bit more widespread—45% of plants. But the majority are geared to the humanities. That's fine as far as it goes. But

CRAFT TRAINING PROGRAMS...

BY SIZE OF PLANT	YES	NO	BY CLASS OF PLANT	YES	NO
2-10 CRAFTSMEN	11%	89%	1 HEAVY PROCESS	63%	37%
11-50 CRAFTSMEN	22	78	2 LIGHT PROCESS	23	77
51-150 CRAFTSMEN	30	70	3 HEAVY FABRICATION	34	66
OVER 150 CRAFTSMEN	66	34	4 LIGHT FABRICATION	18	82
ALL PLANTS	31	69	5 BENCH-WORK	30	70

...AND WHAT THEY COVER

ALL PLANTS*	YES	NO		YES	NO
INSTRUMENTS	50%	50%	ELECTRONICS	35%	65%
MECHANICS	59	41	HYDRAULICS	24	76
ELECTRICIANS	73	27	OTHER SUBJECTS	34	66

*Percentages of those with programs. 77% reported covering 2 or more of the indicated skills.

SUPERVISOR TRAINING...

BY SIZE OF PLANT	YES	NO	BY CLASS OF PLANT	YES	NO
2-10 CRAFTSMEN	56%	44%	1 HEAVY PROCESS	55%	45%
11-50 CRAFTSMEN	28	72	2 LIGHT PROCESS	49	51
51-150 CRAFTSMEN	54	46	3 HEAVY FABRICATION	38	62
OVER 150 CRAFTSMEN	62	38	4 LIGHT FABRICATION	49	51
ALL PLANTS	45	55	5 BENCH-WORK	30	70

...AND WHAT IT COVERS

ALL PLANTS*	YES	NO		YES	NO
ORIENTATION	56%	44%	WORK MEASUREMENT	16%	84%
LABOR RELATIONS	55	45	WORK SIMPLIFICATION	32	78
HUMAN RELATIONS	56	44	WORK SAMPLING	12	88

*Percentages of those with programs. 67% reported covering 2 or more of the indicated topics.

WHERE INDUSTRY IS SPECIALIZING ITS MAINTENANCE...

...BY TYPES OF EQUIPMENT ...BY COMBINATION-CRAFTSMEN

Figures in table are percent of plants. They do not add to 100%. In each case, the remainder of plants reported either they do not have any need for the specialty or combination, or (in a very few cases) they are undecided whether they need it.

CLASS OF PLANT	Pumps		Instruments		Hydraulics		Pneumatics		Electronics		Electrician-hydraulic		Mechanic-millwright		Electrician-mechanic		"Automation mechanic"		General mechanic	
	Have specialty	Do not have but should	Have specialty	Do not have but should	Have specialty	Do not have but should	Have specialty	Do not have but should	Have specialty	Do not have but should	Have combination	Do not have but should	Have combination	Do not have but should	Have combination	Do not have but should	Have combination	Do not have but should	Have combination	Do not have but should
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
1 HEAVY PROCESS	29	6	88	8	13	6	15	7	45	11	7	7	58	13	23	25	5	12	36	40
2 LIGHT PROCESS	13	1	56	15	4	7	4	7	31	30	3	5	51	11	34	21	15	8	54	23
3 HEAVY FABRICATION	17	2	28	26	20	18	15	6	45	20	4	9	49	13	20	18	5	17	42	21
4 LIGHT FABRICATION	8	8	28	23	11	18	6	8	38	21	14	14	57	10	38	23	8	18	63	18
5 BENCHWORK	15	9	37	14	15	15	12	13	45	20	11	6	45	20	35	14	9	25	58	11
ALL PLANTS	15	5	44	19	13	13	10	8	41	21	8	9	52	13	30	21	8	15	50	23

knowing when to pat Joe on the back and when to take a firm stand is only part of the knack of managing. Supervisors also need to know more about modern management techniques. We checked on two of these—work sampling and work measurement (which is hardly very new, especially to production operations)—and found that discouragingly few are getting it.

Use of area maintenance

Some 46% of all plants said they have no area maintenance set-up. In those plants with any work on an area basis, 20% is the median amount of the workforce assigned to areas. About 11% of all plants have more than half of their force assigned to areas, and 4% use area maintenance almost exclusively (90% or more of total force).

Specialists for maintenance

The two-part table above suggests industry is waking up to the fact that it can cut labor costs and raise the quality level of maintenance by establishing craft classifications for special types of equipment, and by setting up combination-craft classifications.

As you examine the table, you'll note that more often than not, where a need is felt to exist, it has been satisfied in a good majority of such plants. But this situation does not hold with respect to the "automation mechanic" (except in light process plants). There are other deviations from the pattern in individual classes of plant (for example, the need for hydraulic specialists has been met in just over one-third of light fabricating and light process plants).

The trend to "troubleshooters" (distinguished from equipment specialists) for highly specialized or automated equipment appears to have gained a firm foothold. Maintenance departments in 54% of all plants have them—and there's remarkably little variation by class of plant, or among the three smallest sizes of plant. But the biggest plants (over 150 craftsmen) rack up a significantly higher score: 71% use them.

Here is the background of troubleshooters in plants with one or more (48% gave more than one answer):

College or technical equivalent 25%
Technical vocational 59%
Upgraded craftsmen 77%

This indicates that industry is pretty well aware of the need for technical skills. But other questions raise doubts whether industry is as much concerned about managing these skills in such a way as to insure their use at lowest cost.

How Industry Controls Its Maintenance Costs

ON THE SURFACE, at least, industry seems to be doing a fair-to-middling job of keeping tabs on its maintenance costs. In a few cases, there's no question that it's doing a superb job. Those are the major conclusions you can draw from the survey questions reported on this and the next two pages.

Obviously the starting point for knowing costs is to know what is being done. That calls for a formal work order system—whether the records be written, typed, punched cards, etc.—two copies or a dozen. Here's the score on this key question:

Do you have a formal maintenance work order system?

	Per cent of plants	
Class of plant	**Yes**	**No**
Heavy process	96	4
Light process	91	9
Heavy fabricating	86	14
Light fabricating	83	17
Benchwork	89	11
Size of plant by number of craftsmen		
2-10	64	36
11-50	88	12
50-150	94	6
Over 150	100	0
All plants	88	12

The fact that as high as 12% of all plants have no formal system—even though this condition is heavily concentrated in plants with 50 craftsmen or fewer—is a disturbing one. We've long suspected the situation was bad in many plants with 10 or fewer craftsmen, but it's shocking to learn that as many as 36% are in this sorry shape.

Who plans and analyzes maintenance jobs before assignment to workers?

	Per cent of plants
No one	5
Craft foreman or group leader	84
Engineering estimator	35
Staff planner or work analyst	13
More than one of above	33

The concept of preplanning a job by an engineer or staff man has not been widely adopted (from 35 to 48% have done so, with some plants indicating both engineering estimator and staff planner). Even in the largest plants (over 150 craftsmen), preplanning is done in a maximum of 71% (engineer 45%, planner 26%, with substantial duplication).

But even where there is preplanning, craft supervisors are the men who are likely to be burdened with this responsibility (presumably on the shorter, simpler jobs). In only 18% of the largest plants is the foreman completely free of this chore. In 25% of the smallest plants foremen are not involved—in fact, 12% of these plants don't preplan the work at all. In only 13% of all the plants does engineering or staff planning relieve the foreman completely.

This situation is typical of that found in the job production shop of about 20 to 30 years ago. It's our feeling that today's production techniques (almost complete preplanning) are the pattern for the maintenance techniques of tomorrow—and the sooner they are adopted, the better.

Scheduling the maintenance work

Do you set up daily work schedules?

	Per cent of plants
Yes	78
No	22

The mere fact of a daily work schedule doesn't prove anything. So those replying "Yes" were asked these additional questions:

What proportion of your maintenance work falls into each of these categories:

A. Total daily work scheduled?
B. Total daily work completed on schedule?
C. Scheduled work that is preventive maintenance?
D. Unscheduled work that is emergency?

	A	B	C	D
	Per cent of plants			
All	9	5	1	4
More than half	55	58	6	13
About half	21	26	14	8
Less than half	15	11	77	75
None	0	0	2	0

The disappointing part of all this is that as high as 36% (of the 78% that set up daily work schedules at all) regularly schedule no more than half of the work. And 37% get half or less completed on schedule.

(Actually, there's a possible ambiguity in the second part of the question. Some respondents may have interpreted it to mean "proportion of *all* work completed on schedule." Others may have construed it as "proportion of *scheduled* work." The latter, of course, was intended; but a few write-in comments indicate it was not always answered with that meaning in mind.)

The other key point developed here is that in 75% of the plants less than half of the unscheduled work is emergency work. (In an ideal situation, all non-

HOW MUCH FOR PREVENTIVE MAINTENANCE

(in plants with separate PM cost records)

PM COST AS PERCENT OF TOTAL MAINTENANCE AND REPAIR COST	SIZE OF PLANT BY NUMBER OF CRAFTSMEN				
	2-10	11-50	51-150	OVER 150	ALL PLANTS
	PERCENT OF PLANTS				
1-9%	20	10	10	20	14
10-19%	20	38	35	33	35
20-29%	40	28	20	20	25
30-49%	20	17	22	14	18
50% OR MORE	0	7	10	13	8

WHO COMPILES MAINTENANCE COSTS

	SIZE OF PLANT BY NUMBER OF CRAFTSMEN				
	2-10	11-50	51-150	OVER 150	ALL PLANTS
	PERCENT OF PLANTS				
. . . Not compiled	13	5	3	0	5
. . . Maintenance department only, not tied in with accounting records	27	23	27	14	25
. . . Accounting department only, not tied into general ledger	13	21	17	25	22
. . . Accounting department only, tied into general ledger	48	55	64	65	64
. . . More than one of above, or some procedure not specified here	0	5	10	13	8

Controlling Maintenance Costs...

Begins on page 99

emergency work would be scheduled, so the answer to this part would be "all"—as it was in 4% of plants.)

The situation in most plants indicates a looseness that may be caused by poor scheduling, poor estimates, or habitual upset of schedules by new priorities.

Operating maintenance stores

In the operation of your maintenance storeroom, do you have . . .

A. A coded spare-parts identification system?
B. Spare-parts catalog for craftsmen and stores?
C. Spare-parts and tool delivery system to job?

Number of craftsmen	A	B	C
	Per cent of plants		
2-10	17	52	6
11-50	33	48	8
51-150	51	52	14
Over 150	71	68	37
All plants	42	53	15

As you might expect, a good majority of the largest plants have a coded spare-parts identification system. While a very small plant might get along passably well without such a system, there's a great deal still to be accomplished, especially in the medium-sized groups.

On the matter of catalogs, there's not as much difference as you might expect between the largest and smallest plants. The fact that half of even the smallest have catalogs demonstrates that they are not "big plant" items. Every plant can use them profitably to insure that craftsmen get exactly what they need—and get it fast.

Delivery systems are related to the size of the maintenance force (the table shows that) and also to the area of the facility. That probably accounts for the fact that even 6% of the plants with 10 or fewer craftsmen use them.

Reducing unit costs

Despite an increase of almost 20% in maintenance labor and material costs in the past five years, (FACTORY "Cost Index" up from 137.3 to 164.1, Jan. 1953 to Jan. 1958), many plants have actually managed to record a decrease in total maintenance cost per unit of plant output. In fact, 31% have done so—and 18% of this group report that the decrease has exceeded 20%. An additional 9% of all plants report no change.

While 38% of the plants say they don't know how much unit costs have changed (plants built within the last five years, of course, have no basis for comparison), it's surprising that as few as 22% have experienced an increase. And 59% of those have had an increase of less than 20%.

Segregating wage costs

One aspect of maintenance cost that keeps cropping up almost constantly is the split between wages and materials. FACTORY made a limited survey on this point four years ago when we developed and introduced our maintenance "Cost Index" (See Press Time Report, following p. 86 this issue). We found then that 60% for wages and 40% for materials was the nearest "round number" division. Here's how the results come up in this much larger survey:

Per cent of wages for craftsmen in total maintenance cost	Per cent of plants
26-35	4
36-45	9
46-55	19
56-65	38
66-75	20
76-85	8
86-95	2

Note: No answer was less than 26% or more than 95%.

METHOD OF KEEPING MAINTENANCE COSTS

	SIZE OF PLANT BY NUMBER OF CRAFTSMEN				
	2-10	11-50	51-150	OVER 150	ALL PLANTS
	PERCENT OF PLANTS				
. . . No records	15	6	4	0	5
. . . Written records (hand or typed)	75	77	67	72	73
. . . Mechanical hand sort (such as Keysort)	4	7	5	6	6
. . . Punched card (such as IBM, Remington Rand)	10	27	45	65	36
. . . Electronic data processing machinery	0	1	6	13	5
. . . More than one of above	4	16	23	41	22

HOW MUCH DETAIL IN MAINTENANCE COSTS

	SIZE OF PLANT BY NUMBER OF CRAFTSMEN				
	2-10	11-50	51-150	OVER 150	ALL PLANTS
	PERCENT OF PLANTS				
. . . Total costs only, for labor and material for entire plant	26	9	6	4	10
. . . Subdivision by major accounts for repair, replacement, new work, etc.	6	9	9	11	9
. . . Further subdivision by department or cost center	52	41	34	26	37
. . . Further subdivision by machine or process	16	41	51	59	44

If you're statistically minded you'll see at once that this is an almost perfect "normal" distribution curve. That is, it is symmetrical about its mid-point. In this case both the average and the median are almost exactly 60% of the total maintenance cost going for wages. This is confirmation, indeed, that despite changes in costs of both labor and materials, the 60-40 split remains valid.

Estimating PM costs

If you take the 22% with no work schedules and add the 2% in which none of the scheduled work is preventive maintenance (page 99), by subtraction from 100% you find 76% of plants that profess to be doing at least some preventive maintenance (PM). Yet only 25% of all plants keep separate costs on PM—a mere one-third of those with a PM program. While you'd expect the figure to be low in plants with 10 or fewer craftsmen (it is—only 12%), a mere 27% of even the largest plants keep separate PM costs. The high point of 32% is in plants with 50-150 craftsmen.

The fact that so few plants can give even a lump-sum figure for PM cost betrays poor recognition of the need for proper cost breakdowns for proper control of maintenance. But the sun may be on the horizon: A fair handful of plants indicate by write-in that they have just started to keep separate costs on PM.

The chart (upper left, facing page) shows the percentage of total maintenance and repair cost devoted to PM *in those plants with separate PM cost records.*

While the coverage is meager because of the scarcity of records, the fact that cost of PM has been pinned down at all (we believe for the first time in any survey) should prove helpful to those trying to get programs started. The single most interesting fact to come to light is that the median expenditure for preventive maintenance is 20% of total maintenance and repair cost, regardless of size of plant (to be precise, it's 19% in the largest plants).

While we're convinced that a still larger share for PM would make economic sense in many plants, this 20% "experience" figure is a sound basis for planning.

Keeping the records

The last three tables above are on records. The first of these shows that 5% of plants keep no cost records. When you remember (p. 99) that 12% have no work order system, the quality of the cost figures in the remaining 7% of the plants is open to question.

It's encouraging to see that 64% have their cost records tied into the general ledger—a "must" for getting true costs. But this alone doesn't insure good control. More is needed.

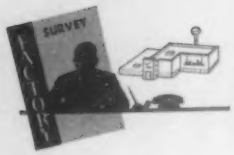
Accuracy in accumulating and analyzing maintenance costs is the second necessary factor. While at least 67% of plants (see 51-150 group) still rely on written or typed records at some stage of the process (at least 71% of the smallest rely on them exclusively), a hefty majority of the larger plants also use some mechanical aid. With the complexity of cost factors today, that's essential for adequate analysis.

The real surprise is that as many as 5% of the plants (and 13% of the large ones) are already using electronic data processing machinery (EDPM). It's doubtful that maintenance activities alone would justify EDPM. But the fact that some maintenance executives are taking advantage of a company's EDPM indicates the importance they attach to details in cost analysis.

This latter points directly to the third factor in good maintenance cost control: adequate detail in the records. The picture here is disappointing.

Even in the largest size group only 59% break down costs by machine or process. If you stop short of this, your records aren't much help in determining when maintenance cost for particular equipment is so high that replacement is indicated. The other view is that 59% is probably as high a proportion of plants as break down direct production costs to this degree. That the remainder work with lump sums or department averages is one of the reasons unit production cost figures are so nearly meaningless in many plants.

To cap the climax, the survey shows that as many as 15% of the plants (even among the largest ones) do not go beyond major accounts in their breakdown. A worthwhile analysis of maintenance costs and performance is almost hopeless under those conditions.



What Industry Is Doing About Its Maintenance Headaches

IN RECENT YEARS the practice of subcontracting maintenance work has extended far beyond the traditional "letting out" of such chores as window cleaning and roof repair. The upper table on the facing page shows how far it has gone in eight key areas.

There are several pressures behind this trend. Perhaps the most urgent is the lack of proper skills or tools, particularly in the smaller plants. Take instruments as an example: Of almost half the plants that subcontract their instrument work, 38% subcontract some of it, 11% subcontract all. Of those that subcontract any, the median amount is 56% of the total dollar volume of instrument maintenance cost. In the smallest plants (2-10 craftsmen) 63% farm out a median of 80% of the work. In the largest, only 23% farm out a median of 35% of the work.

The other major pressure is wide variations in the man-hour workload. The larger plants, obviously, have more flexibility in shifting manpower to big jobs while avoiding the problems of temporary hiring, layoffs, etc.

The "size of plant" pattern isn't so pronounced when it comes to process equipment and production machinery and services. Except for process equipment in the very smallest plants, there are only slight variations in an across the board pattern in these categories.

Exploiting special techniques

Both old and new techniques (bottom table, facing page) are being used in the maintenance departments of a great many companies. But the survey does not indicate the degree of use in a particular plant—it may be extensive or it may be just experimental "dabbling."

Another warning is in order concerning interpretation of the figures in this table: There is good reason to believe that the descriptive headings applied to these techniques (exactly the same in the questionnaire as in the table) were subject to widely varying interpretations by the respondents. For example:

. . . *Work simplification,* in the minds of some people, is little if any different from methods engineering. They are very different (FACTORY, July 1958, p. 72). But you can't force people to accept that idea.

. . . *Work sampling* is a term coined by FACTORY (July 1952) that has caught on remarkably. But some people who use ratio-delay studies don't recognize them as part of the broader area of work sampling.

. . . *Statistical analysis and operations research* are both still so new there's little agreement even among "experts" as to what is and is not included. But because even by the most liberal definition they call for a high degree of mathematical sophistication, we were amazed to find as many as one in five of the smallest plants (2-10 craftsmen) claiming to use them. The still higher percentages among the larger plants are almost as difficult to accept.

Taken as a whole, the highest scores occur where technical problems are involved—parts failure and downtime analysis. Even with all the qualifications on the specific accuracy of results, the general picture is better than expected, but still has plenty of room for improvement.

Using maintenance indexes

The growing demand by higher management for statistics on the costs and performance of the maintenance function has required the development of two different types of indexes. There are many variations of each.

External cost index—Purpose here is to adjust maintenance costs to a common or constant-dollar base by compensating for changes in unit labor and materials costs. Some 38% of plants use such an index.

The maintenance executive has a choice of using FACTORY's Cost Index for all industries (or modifying it for his particular situation), using a special industry index, or constructing an index specifically for his company or plant.

While 33% of those using an external index are using FACTORY's, only 3% use a special industry index. The surprising thing is that 74% report use of their own company index. Since this is a difficult thing to do, it seems probable that some respondents misconstrued the question, actually reported here the use of an internal company index (see below). Other possibility is that more plants than we suspected are extracting appropriate elements from FACTORY's index, reweighting them to fit their own circumstances.

Internal index—Purpose here is to find a readily available plant statistic that presumably has a direct relationship to the amount of maintenance required. This type of index is used by 73% of all plants.

Respondents were offered a choice among five commonly used bases, asked to write in others. Here's the tally among plants that use an internal index of any sort (with 46% indicating more than one):

. . . *57%* use direct labor.
. . . *39%* use amount of downtime.
. . . *32%* use units of output.
. . . *17%* use dollars of sales.
. . . *16%* use kilowatt-hours of power consumption.
. . . *14%* specify some other base.

Most popular among the "others" was some variant of plant investment—replacement cost, initial cost, adjusted plant capitalization, active plant, etc. Also mentioned were square footage, cost of maintenance materials, total labor, and total manufacturing cost.

HOW MUCH SUBCONTRACTING OF MAINTENANCE WORK

SIZE OF PLANT	PERCENT OF PLANTS THAT SUBCONTRACT...	Maintenance and Repair Activity (major new construction excluded)							
		BUILDINGS, FACILITIES (roof repair, cleaning, etc.)	PLANT SERVICES (air conditioning, lighting, etc.)	PLANT UTILITIES except electrical (gas, water, air, etc.)	ELECTRICAL FACILITIES	INSTRUMENTS	PRODUCTION MACHINERY	PRODUCTION SERVICES (tools, dies, etc.)	PROCESS EQUIPMENT
2-10 CRAFTSMEN	...NO WORK	26	36	73	53	37	60	52	68
	...SOME WORK	65	55	27	39	37	40	46	30
	...ALL WORK	9	9	0	8	26	0	2	2
	MEDIAN PERCENT OF WORK SUBCONTRACTED	**46**	**36**	**32**	**25**	**80**	**15**	**30**	**40**
11-50 CRAFTSMEN	...NO WORK	16	37	66	68	41	66	54	72
	...SOME WORK	77	59	33	30	44	34	46	28
	...ALL WORK	7	4	1	2	15	0	0	0
	MEDIAN PERCENT OF WORK SUBCONTRACTED	**50**	**33**	**24**	**17**	**66**	**12**	**24**	**15**
51-150 CRAFTSMEN	...NO WORK	16	32	76	62	50	66	63	75
	...SOME WORK	82	67	24	38	45	34	37	24
	...ALL WORK	2	1	0	0	5	0	0	1
	MEDIAN PERCENT OF WORK SUBCONTRACTED	**47**	**42**	**12**	**13**	**40**	**10**	**18**	**15**
OVER 150 CRAFTSMEN	...NO WORK	14	38	74	73	77	72	62	73
	...SOME WORK	83	59	26	27	22	28	38	25
	...ALL WORK	3	3	0	0	1	0	0	2
	MEDIAN PERCENT OF WORK SUBCONTRACTED	**20**	**14**	**13**	**12**	**35**	**17**	**25**	**15**
ALL PLANTS	...NO WORK	17	36	71	65	51	66	57	72
	...SOME WORK	78	60	29	33	38	34	43	27
	...ALL WORK	5	4	*	2	11	0	*	1
	MEDIAN PERCENT OF WORK SUBCONTRACTED	**44**	**30**	**18**	**14**	**56**	**13**	**24**	**16**

Medians computed from plants subcontracting "some" or "all." Basis is percentage of dollars of total cost for each activity. *Less than 0.5%.

WHAT SPECIAL TECHNIQUES ARE BEING USED FOR SOLVING MAINTENANCE PROBLEMS

CLASS OF PLANT	TECHNIQUE (PERCENT OF PLANTS)							
	Standard Procedures	Methods Engineering	Work Sampling	Work Simplification	Downtime Analysis	Parts Failure Analysis	Statistical Analysis	Operations Research
1 LIGHT PROCESS	65	44	42	60	62	77	51	26
2 HEAVY PROCESS	51	33	28	42	70	69	35	21
3 LIGHT FABRICATION	66	48	32	53	65	70	37	26
4 HEAVY FABRICATION	40	26	11	33	58	61	13	16
5 BENCHWORK	61	32	35	45	42	53	20	12

CLASS OF PLANT	TECHNIQUE (PERCENT OF PLANTS)							
	Standard Procedures	Methods Engineering	Work Sampling	Work Simplification	Downtime Analysis	Parts Failure Analysis	Statistical Analysis	Operations Research
2-10 CRAFTSMEN	45	26	11	30	64	59	20	18
11-50 CRAFTSMEN	54	33	26	44	61	72	34	17
51-150 CRAFTSMEN	60	40	30	52	63	63	32	23
OVER 150 CRAFTSMEN	63	46	40	54	57	72	36	26
ALL PLANTS	55	37	27	46	61	62	31	21

HOW MAINTENANCE WORKERS ARE UNIONIZED

CLASS OF PLANT	Craft Union	Plant-wide Union	Both Craft & Plant-Wide Unions	Not Unionized
	PERCENT OF PLANTS			
1 HEAVY PROCESS	8	72	12	8
2 LIGHT PROCESS	12	63	6	19
3 HEAVY FABRICATION	5	73	17	5
4 LIGHT FABRICATION	6	54	11	29
5 BENCH-WORK	3	40	22	35

SIZE OF PLANT	Craft Union	Plant-wide Union	Both Craft & Plant-Wide Unions	Not Unionized
	PERCENT OF PLANTS			
2-10 CRAFTSMEN	7	56	2	35
11-50 CRAFTSMEN	4	62	11	23
51-150 CRAFTSMEN	10	65	13	12
OVER 150 CRAFTSMEN	10	65	21	4
ALL PLANTS	7	62	13	18

How Industry Deals With Its

AS YOU'D EXPECT in a survey sample that is heavily weighted toward larger and "better" plants, the overwhelming majority of them have their maintenance workers organized in unions. There are some marked variations by class of plant and by size (as shown in the table above), but there's no pattern from which any conclusions emerge.

Not indicated in the table is the fact that in 12% of the organized plants there are two unions represented in the maintenance department. Another 3% have 3 unions; 2% have 4; and 4% have 5 or more. One plant reports dealing with 10 separate unions.

Area of union-management relations	Change in past 3 years: Better	Same	Worse
	Per cent of plants		
Handling grievances	53	43	4
Planning work arrangements	45	51	4
Worker productivity	34	56	10
Installing new paperwork	31	65	4
Selecting, upgrading men	28	65	7
Jurisdictional disputes	24	67	9
Using outside contractors	23	65	12

The area in which union-management relations have been most formalized—handling grievances—shows the most improvement. Yet there has been little if any change in grievance procedures themselves. This suggests that the replies reflect a growing management willingness to accept and work with the union.

Least improvement shows up in areas where unions act unilaterally—no consultation with management involved—such as jurisdictional disputes and reaction to the use of outside contractors. With the big rise in maintenance subcontracting recently (see pp. 102-103), it's surprising that there hasn't been a worsening of relations in more than 12% of the plants surveyed. It means that management generally is doing a smart job in handling its subcontracting.

Paying salaried personnel

Just as anywhere else in the organization, the quality of staff and supervisory personnel has a distinct bearing on over-all maintenance performance. A feeling that maintenance is a dirty-handed job is liable to keep some capable men away from the maintenance department. The big question is whether low salary scales (perhaps reflecting a top management attitude toward maintenance as dirty-handed) are also a factor in recruiting maintenance management.

As the table (facing page) shows, there are indeed some plants where a craftsman would take a cut in pay along with a promotion to foreman. And it's certainly not an attractive proposition to offer a project engineer the same or less money than a journeyman. Fortunately, such plants are a tiny minority.

The last two columns at the right of the table show the median differential and maximum differential in pay. The maximums look good indeed. And the medians are just about what is generally considered acceptable minimum differentials. But that means 50% of the plants are below standard. Certainly the 14 to 26% of plants in which engineers and foremen enjoy a differential of less than 10% wouldn't have to look

HOW MUCH PAY FOR STAFF AND SUPERVISORY PEOPLE

	Minimum difference between average weekly pay of titles at left and highest paid journeyman (excluding overtime)										
	1-20% LESS	NO DIFFERENCE	1-10% MORE	11-20% MORE	21-30% MORE	31-40% MORE	41-50% MORE	51-100% MORE	Over 100% MORE	MEDIAN DIFFERENCE	MAXIMUM DIFFERENCE
	PERCENT OF PLANTS									ALL PLANTS	
STAFF ENGINEER	1	6	7	27	19	13	14	10	4	+25%	+222%
PROJECT ENGINEER	2	6	11	28	15	13	10	9	6	+24%	+200%
WORK PLANNER	3	25	28	25	12	6	1	—	—	+ 8%	+ 50%
CRAFT FOREMAN	1	2	23	34	20	9	6	3	2	+18%	+173%
PRODUCTION FOREMAN	1	10	17	32	22	8	3	5	2	+18%	+185%

Maintenance Employees

very hard to find real "money discontent" among their maintenance staff and supervisory personnel.

The work planner is something of an "in-betweener" in this situation. He doesn't rate as management or even "staff" in many plants, yet his collar is far more white than blue. His pay reflects this indecision.

The pay of production foremen parallels very closely that of craft foremen. But if national statistics on relative pay for hourly craft workers and hourly production workers apply in the surveyed plants (the craft workers run 28% higher), then the production foreman enjoys a far larger differential above the men he supervises than does the craft foreman.

Measuring the work

With the widespread application of work measurement (WM) to production, it's a shock to find only 38% of plants apply it to maintenance. Best showing is by the largest plants (56%). But that 24% of the smallest use WM proves it is not for big plants only.

Among plants using WM, 81% rely on foremen's or engineers' estimates as a basis (hardly a true measurement); 52% rely on historical records (perpetuating past performance levels, good or bad). Even with 52% using two or more methods, only 18% use standard times based on time study or elemental data for any part of their coverage. That a mere 4% use a benchmark system like Universal Maintenance Standards may not be too bad considering UMS was introduced less than three years ago (FACTORY, Nov. 1955).

Paying by incentives

Maintenance incentives are in use in only 11% of all plants (a bit less than one-third of those with work measurement). Plant-wide profit-sharing or bonus plans were not included in these questions.

Of the 37 plans reported, 10 are restricted to supervisors only and 6 to supervisors and clerks. In other words, only 21 include craftsmen (13 include all craftsmen, the others only some of the craftsmen). A total of seven plans provide complete coverage of all supervisors, clerks, and craftsmen. There is no information whether these plans with "mixed" coverage provide incentives on an individual or group basis.

One of the questions most frequently tossed at FACTORY editors is why so few maintenance departments have incentive plans. It is sometimes suggested this is because other plants have had unhappy experiences leading to abandonment of plans. Of the 359 plants FACTORY surveyed, 19 report that they had an incentive plan at one time, and have since dropped it. And here are the reasons they cited:

. . . *6 plants* say "administration is too costly."
. . . *7 plants* cite "labor objections."
. . . *6 plants* report "inadequate coverage."

In all, five of the plants name more than one reason for dropping their maintenance incentives. While one plant offers the "write-in" explanation that there is "too much variety in the work," all the others boil down to the same sort of woes that can beset a poorly conceived or poorly administered incentive pay plan for production workers.

Where Industry Is Updating Its

IT'S NICE to have a new plant. As you can see in the tables at the right, your new plant is more likely to provide you with such "plusses" in working conditions as air conditioning and high lighting levels. But you don't have to have a new plant to get these features. The tables prove that, too.

Air conditioning today—Except, perhaps, for the "executive suite," air conditioning was almost unheard of—even for offices—in plants before World War II. Yet over half the plants of that vintage now have almost complete air conditioning in the offices. (We considered that 80% or more of an area represented "complete" air conditioning; the remainder is likely to be storage rooms, corridors, and the like—areas that are hard to handle with package units, and are occupied only intermittently.)

In manufacturing areas this picture isn't nearly so good. But even here, 7% of the oldest plants have complete air conditioning. While process requirements might have dictated installation of air conditioning at time of construction, it's a fair presumption that it has been accomplished through modernization in most if not all. The fact remains that these 7% prove that air conditioning can be added even to an old plant.

The stinger in air conditioning of manufacturing areas is that only 12% of even the newest plants (compared to the 7% among the oldest) have done a complete job. When you examine the spread by class of plant, it becomes clear that so-called process requirements are not a dominant factor (expect, maybe, where just a small area has been air conditioned). It adds up to one conclusion:

The extent of air conditioning (or lack of it) in manufacturing areas is largely determined by management's attitude toward air conditioning as an employee morale and productivity factor—rather than by the age of the plant and characteristics of the operations.

Lighting today—It has been modernized, too. But management's record here isn't nearly as good as in air conditioning. Among prewar plants, 22% are atrociously underlit—19 foot-candles or less (and 2% report an appalling 9 foot-candles or less). The great majority (78%) are still below the 40 foot-candles that has been generally accepted as minimum for almost a decade. Only 6% exceed the 60 foot-candles that's accepted today as a good minimum. The remaining 16% (table incorrectly shows 17%) have presumably had one postwar round of lighting improvement—but so many years ago that they are behind today's leaders.

But the sharpest indictment must be leveled at the managements and designers of 36% of the plants built within the last five years. In that 36% lighting is below the 40 foot-candle level.

Noise conditioning—It's getting a good play. Mostly the application has been in office areas, where there is not a great deal of variation by class of plant. When it comes to manufacturing areas, 30% or less of the plants have done *any* noise conditioning, except in the benchwork plants. Among the latter, 61% have done some noise conditioning and 15% have conditioned 76% or more of their manufacturing area. None of the fabrication plants and only 3% each of the heavy process and light process plants have noise conditioned 76% or more of their areas. Here is the over-all picture:

Per cent of area noise conditioned	Per cent of plants	
	Offices	Mfg. areas
None	31	73
1-25%	21	18
26-50%	12	6
51-75%	6	1
76-100%	30	2

Note: Specific figures reported tend to "bunch" at the top of range (i.e., at 25%, 50%, 75%, 100%).

FACTORY has repeatedly documented the advantages of good working conditions as inducements to higher worker productivity, better health, less absenteeism, and better quality work. Air conditioning, lighting, and noise conditioning rank high on any list of working conditions affecting worker performance. In sum, we can say the survey shows that higher management has generally recognized this as far as office workers are concerned—and has done something about it. On the other hand, workers in manufacturing areas have been virtually shut out, although just enough plants—both old and new—have done something about it to prove that it is possible. More than that, they have proved that it makes economic sense.

Cleaning up air and water

There's plenty of evidence that most managements are acutely aware of their public responsibility to control and minimize both airborne and waterborne contaminants. Here's a rundown on the plants that have air-pollution and water-pollution control facilities:

Class of plant	Per cent of plants with pollution-control facilities	
	Air	Water
Heavy process	81	79
Light process	58	51
Heavy fabrication	41	41
Light fabrication	37	26
Benchwork	46	44

That heavy process plants lead the parade with a four-out-of-five score is no surprise. Potentially the worst offenders, they have done the best job. When you consider the nature of the operations, you might expect benchwork plants to have the lowest scores (rather

Plant Facilities

than middle rank). Two factors tend to raise the level for benchwork plants: Almost half of these plants have been built within the past five years; and more than a quarter of them are located in the smog-conscious Greater Los Angeles area.

The lowest score in each instance (37% for air, 26% for water) was racked up by the light fabrication group. But even those figures are not inconsiderable when you remember that, as a rule, anti-pollution facilities do not produce any direct economic return.

Guarding against disaster

FACTORY's survey checked on three aspects of the broad area of disaster control:

Does your plant have . . .	Per cent of plants Yes	No
. . . a formalized Civil Defense set-up	29	71
. . . other catastrophe program (flood, weather, etc.)?	32	68
. . . special plant bomb shelters for all employees?	4	96

In some communities, Civil Defense functions primarily as an organization to combat natural disaster. In others it is strictly standby in event of war. While it was not possible to make a cross-tabulation of returns on an area basis, it's probable that some plants believe that their CD participation makes unnecessary any additional program to protect against flood, tornado, hurricane, etc. Of course, how much of the CD participation is really dedicated effort—and how much is mere lip service to local pressure—is anybody's guess.

With only 4% of plants providing bomb shelters for employees, you might surmise that industry isn't very worried about bombing attacks. But considering the lack of any national policy or program, even 4% is a fair showing on a high-cost, no-profit item.

Reprints of this report . . .

. . . and of last month's equally searching electrical survey report are now available. Prices: "Maintenance Management Practices Today," 1-99 copies, 50¢ each; 100-299 copies, 45¢; 300 copies and more, 40¢. Same price scale for "Electrical Management and Maintenance Practices Today" (from August FACTORY).

Also available: Full set of mimeographed sheets containing complete basic data from which both survey reports were prepared; price, $5.25 a set. Write to Reader Service Department, FACTORY, 300 West 42nd St., New York 36.

WHERE INDUSTRY IS AIR CONDITIONED

	BY CLASS OF PLANT	Percent of area air conditioned: NONE	1-9%	10-29%	30-79%	80-100%
		Percent of plants				
MANUFACTURING AREAS	1 HEAVY PROCESS	52	25	7	7	9
	2 LIGHT PROCESS	51	15	18	9	7
	3 HEAVY FABRICATION	78	16	1	1	4
	4 LIGHT FABRICATION	66	16	10	3	5
	5 BENCHWORK	21	30	28	9	12
	BY AGE OF PLANT					
	0-5 YEARS	52	12	15	9	12
	6-17 YEARS	68	15	9	4	4
	18 YRS. AND OLDER	50	27	11	5	7
	ALL PLANTS	**58**	**19**	**11**	**5**	**7**
OFFICE AREAS	BY AGE OF PLANT					
	0-5 YEARS	13	3	10	3	71
	6-17 YEARS	11	8	10	12	59
	18 YRS. AND OLDER	6	9	17	14	54
	ALL PLANTS	**10**	**7**	**12**	**11**	**60**

HOW OLDER PLANTS LAG IN LIGHTING

	BY AGE OF PLANT	Average foot-candles at working height: 0-19	20-39	40-59	60-79	80 OR MORE
		Percent of plants				
MANUFACTURING AREAS	0-5 YEARS	0	36	46	8	10
	6-17 YEARS	19	47	19	13	2
	18 YRS. AND OLDER	22	56	17	3	3
	ALL PLANTS	**17***	**47**	**24**	**8**	**4†**
GENERAL OFFICES	BY AGE OF PLANT					
	0-5 YEARS	0	13	37	37	13
	6-17 YEARS	0	16	52	22	10
	18 YRS. AND OLDER	0	19	61	15	5
	ALL PLANTS	**0**	**17**	**53**	**22**	**8**
FACTORY OFFICES	BY AGE OF PLANT					
	0-5 YEARS	0	15	59	18	8
	6-17 YEARS	2	34	49	9	6
	18 YRS. AND OLDER	1	42	49	6	2
	ALL PLANTS	**1**	**34**	**50**	**10**	**5**

* 2% (all in older groups) report 9 foot-candles or less
† 1% (2 of 3 in newest group) report 100 foot-candles or more

THIS IS A NORMAL PAY-RAISE SCHEDULE BUT...

INTERVAL BETWEEN RAISES	JOB GRADE	NORMAL MINIMUM (Starting Pay)	SUCCESSIVE NORMAL RAISES 1st Raise to...	2nd Raise to...	3rd Raise to...	4th Raise to...	NORMAL MAXIMUM		POSSIBLE MAXIMUM
3 Months	1	$ 50.00	$ 52.35	$ 54.60	$ 57.05	---	$ 59.60	Increases to maximum granted only for sustained, superior performance.	$ 60.95
	2	54.60	57.06	59.60	62.30	---	65.10		66.60
6 Months	3	59.60	62.30	65.10	68.05	---	71.10		72.70
	4	65.10	68.05	71.10	74.30	---	77.65		79.40
	5	71.10	74.30	77.65	81.15	---	84.75		88.60
	6	77.65	81.15	84.75	88.60	---	92.60		96.75
	7	84.75	88.60	92.60	96.75	---	101.10		105.65
	8	92.60	96.75	101.10	105.65	$110.40	115.35		120.55
	9	101.10	105.65	110.40	115.35	120.55	125.95		131.65
9 Months									

Timing Pay Raises to Merit

Today, more than ever, you need workers who excel. Here's a system that matches top performance with quick rewards, spurs employees to do better jobs.

RATING PLANS aren't worth much unless they affect a worker's pay. Without that key factor, supervisors tend to treat the ratings they give employees as casually as any other sheaf of papers. Result: A system that should lead to unbiased employee evaluation often leads, instead, to minor bickering.

But that's not how employee ratings work here at G-E's Circuit Protective Devices Department. Our performance ratings have real meaning. The rating determines the length of time between raises for non-exempt salary employees (see tables above). We cal lour plan the "earned time" system. With it, the higher a man's rating, the quicker he'll get a raise.

By E. F. FISK
Wage and Salary Administrator
Circuit Protective Devices Department
General Electric Company
Plainfield, Conn.

Results? Here are some of them:

. . . *Performance and pay* are linked directly in the employee's mind. An employee knows that if he shines, his raises come through in short order. If he doesn't, he waits.

. . . *Personal interest* in each worker by personnel results from a follow-up system based on the period between raises rather than on fixed once- or twice-a-year review.

. . . *Unequal treatment* of workers is less likely. Supervisors can use ratings as sure guides on salary problems, are less likely to lose perspective in pay practices, less likely to overlook individuals.

John Jones, for example, knows his supervisor rated him down on accuracy and neatness. Jones isn't happy about this. Neither is he eager to improve. But then he notices he's lagging behind other workers in getting a raise. He talks to the boss. Out comes the performance appraisal form. The bad report on accuracy and neatness stares Jones down. But all is not lost. He'll just have to wait a while to get a normal raise.

MERGING TWO SYSTEMS

Our earned-time system combines the advantages of the merit and the step-rate plan. But before we arrived at our new system we had to have a complete understanding of the strengths and weaknesses of both these plans:

Merit system pro's and con's—With a simple merit system the supervisor can grant increases of variable amounts within a given range according to his appraisal of worker performance. A one-year interval is normal.

But there are inequities in this system. It isn't uncommon to find a differential between rates paid older workers and those paid newer employees. Many companies have

. . . MERIT RATINGS CAN ALTER IT

PERFORMANCE APPRAISAL			MONTHS TO NEXT INCREASE (Normal = 6 Months)
SCORE	DESCRIPTION	DEFINITION	
92 to 100%	Outstanding	Far exceeds position requirements.	3 to 4
84 to 92%	Exceptional	Exceeds position requirements.	4 to 5
75 to 84%	Satisfactory	Fully meets all position requirements.	6
67 to 75%	Acceptable	Meets most position requirements.	7 to 8
59 to 67%	Passable	Meets minimum position requirements.	9 to 10
50 to 59%	Inadequate	Fails to meet minimum position requirements.	Probation

a regular performance appraisal system functioning alongside but independent of the merit pay system. Reason: Tie-in seems too difficult.

Take Jim Atkins and Oscar Drood, for example. Jim is a new clerk. He's a whirlwind of efficiency. His supervisor rates him tops in his department. But Jim doesn't get the biggest paycheck in the department. Oscar's pay, on the other hand, is above average but his performance rating isn't. Do you cut Oscar's paycheck or raise Jim's?

Then there's the question of accuracy in performance rating. Most people agree that a formal appraisal system that requires analysis of performance by job elements is an unbiased tool. It's better than potshot appraisal without element breakdowns. It's a guide that makes the supervisor's approach consistent.

Step-rate pro's and con's—This is the opposite of the merit system in many ways. Under this system all employees who do a job satisfactorily reach the same pay rate eventually. Standard steps are plotted within each grade level. Progress to the job rate is a matter of automatic increases at regular intervals. Often the last few steps to the job rate depend on performance measures. These last steps are usually 12 months apart.

Believers in the step-rate plan admit that it doesn't reward outstanding performers. After the employee rises to average proficiency, he is paid the same as others.

SHAPING OUR OWN PLAN

We took the best of each plan to create our earned-time system. We accepted, in part, the idea of the step-rate plan. We agreed that an employee performing a job satisfactorily should eventually reach a certain point in the rate range. This is our "normal maximum" (chart, facing page). But the speed with which he reaches normal maximum pay depends on how well he performs (table, above). He can also rise above the normal maximum by sustained outstanding performance.

On our performance appraisal sheet we give weights to each characteristic based on its importance. For technicians, the highest rating for attitude is 75; for planning, 150. If an employee rates tops in all traits, his score will be 1000 points (100% performance). If he rates in the exact middle of every trait, his score will be 800 points or 80% performance. Table relates these total scores to schedule of time between raises.

The three sections of the chart (set apart by white lines) are a guide to the normal time interval between raises and the normal amount of successive increases. But normal time interval between increases can be shortened or lengthened according to performance. Better-than-average workers get boosted in less-than-normal time. Poor employees wait longer than normal.

Take a job at Grade 5. Normal interval between raises is six months. But the table shows that for an outstanding employee, rated above 92%, it is three or four months.

Extreme right column shows possible maximum pay after an employee has reached his normal maximum. Increases to possible maximum are merit raises based on superior performance.

KEEPING CLOSE TABS

Our new system really improves our salary administration. We make appraisals and salary reviews the year round, keep a profile sheet for each worker on file. Profile sheet points out the period between appraisals and the employee's scores. Salary amounts, promotions, and reclassifications are entered in the profiles as they occur.

About three months after an increase a follow-up notice goes to the worker's supervisor. This tells him it's time for another performance appraisal. If the employee is a superior performer, he may get his raise then. Otherwise, the supervisor projects it into the future.

Salary change forms for increases projected into the future stay in the hands of the salary administrator until just before the increase goes into effect. Then the supervisor gets his copy of the paperwork so he can tell the employee of the raise, talk to him about his work.

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OPERATORS MOVE SUCCESSIVELY FROM STATION TO STATION ALONG THIS ASSEMBLY LINE,

Now They Move the Operator

And that's the key to plump savings on short runs. This new twist in job-lot assembly means less labor, less space—easier schedules, higher quality.

MOVE the operators — not the work. That's the new assembly method shown in the photos above. It's Kin Tel's solution to a familiar problem: How can you assemble medium-size lots of movable products?

Up to now most plants have solved the problem either of two ways: Move the product through an assembly line. Or do the whole job at one bench with one assembler.

Our new way is a third way. We call it "progressive operator assembly." Operators move. The work stays where it is.

"Not new," you say? Well, we admit the principle isn't new. It's been used for years to assemble heavy machinery. But we've adapted the principle to our own needs—small products that *could* be moved readily through a progressive line assembly. That is something new.

Progressive operator assembly pays off for us five ways:

... Lower labor cost—as much as 35% lower.
... Saving of 65% in bench space.
... Elimination of loss of parts.
... Easier scheduling.
... Higher quality, fewer mistakes.

By R. L. HIGGINS
Chief Industrial Engineer
Kin Tel Division
Cohn Electronics, Inc., San Diego

WHY WE CHANGED

Here at Kin Tel we make industrial television and other electronic equipment. Small-order lots, mostly. We've looked with envy at the low-cost, efficient, progressive assembly lines in plants that make electronic equipment in large volume. And that's why we sought a system that would suit our needs. Here's the way we reasoned:

Rate of output—Begin with the basic principle of assembly-line work: Generally, the smaller the portions of a given task assigned to each worker in a group, the higher the efficiency of the group. The most economical and efficient assembly method is to have the product pass by a line of assemblers, each of whom performs the same operations on each passing unit.

But there are other things to think about, too, in assembly-line operation. The most important is the quantity to be produced. Quantity must be great enough to cover the cost of line set-up and the low-pro-

EACH ADDING JUST ONE COMPONENT TO ASSEMBLY.

—But Not the Work

duction period at the start of the run. This low production period is the time it takes the operator to become proficient enough to perform his station task without visual aids or oral instructions. This time varies with industry and type of product.

For example, placing a large component on an automobile line may take 15 minutes—may be a complete task for a two-man station. But on an electronic assembly line a station load of two minutes can include as many as 15 wires that require placement at both ends. It would not take an operator as long to memorize the placing of an auto component with, say, six fasteners as to memorize the far shorter task with some 30 placement positions.

Electronic assemblies are usually built to a pattern, with variations according to type of unit and types of incentives involved. In my experience a production line of 150 operators producing 500 TV sets per 8 hours takes up to 6 working days to reach 50% efficiency, 4 more days to reach 85 to 90%. Mass-production industries can tolerate this because they can spread the cost of this learning-and-low-production period over many units.

Now, with this background, take our situation at Kin Tel. We produce three of our Model 204A galvanometers per hour. They're about the size of a table radio. Yet the radio is probably produced at the rate of one every two or three minutes. A balanced assembly line for galvanometers would require a station time of 20 minutes for each operator. This long station time for galvanometers forbids a progressive assembly line. Why? Because total run would be completed by the time operators learned to work without instructions. We'd be just as well off to let one or two operators assemble the complete unit.

Rate of learning — Learning curves are not generally used in the electronics industry. But it's common knowledge that, within a matter of days, trained assembly operators will memorize a complete station task if it's of only a few minutes' duration.

Memorizing the task for a 20-minute electronics work station, however, would take a much longer time. What's more, a standard electronics work station can hardly be efficiently stocked for a 20-minute operation without causing operators to reach uncomfortably far.

Our conclusion — No hope of using progressive assembly for our type of manufacturing. Whether one operator assembled an entire unit, or whether we divided assembly into several equal portions and distributed the portions among several operators, we still would have two problems: excessive reference time and work-station stocking.

Our action—We wanted to gain the advantages of progressive assembly lines for job-lot operations. Our vice president of manufacturing, George D. Rice, felt this was the key to economy. Our industrial engineers made the study. The result: progressive operators.

HOW OUR SYSTEM WORKS

Operators move past a line of circuit boards or basic chassis on benches. The line is set up with a row of circuit boards or basic chassis placed end to end on each side of a series of benches in a quantity to accommodate daily, weekly, or monthly schedules. A lead girl gives an operator stockpans of precounted quantities of components to match the number of chassis on the line, along with verbal instructions and references to a model or visual aid. Each stockpan is labeled with part number and number of the operation element.

The operator places one component in each chassis as she moves along the benches. Other operators follow, each placing one component according to the planned sequence of operations. Soldering is done the same way.

Turn the page

Begins on page 110

"...operators make each circuit in 15 minutes"

Elemental time standards—We use them to determine the total operators needed for an assembly job. We analyze and break down the operations to arrive at a reasonably balanced time for each walk-around. This process is the same as for balancing any assembly line.

Industrial engineering prepares a complete package of fabrication and assembly instructions—sequence of operation elements, standard time for each operation, necessary visual aids. Copies are given to shop supervisors and the material department well in advance of the production start date.

The material department counts out number of each component in the quantity to be run. Counted components are placed in individual bins and labeled with part and work-element number. Bins are placed in a rack in their numbered sequence and moved to the assembly line.

The assembly line is stocked with circuit boards, wiring chassis, or basic frames, end to end in a row on both sides of a line of 36-in. wide benches. The number of basic units on the line is the same as the number of components in each bin. (Circuit boards are placed on a line of benches with lighted troughs. Lights under the circuit boards give better detail to printed circuits, help the operator find locations for the components.) A model of the unit, visual aids, and the assembly sequence are positioned at the start. The racked bins of components are there, too.

We calculate the number of operators needed by considering the total standard minutes required to produce a complete unit, the number of units in the lot, and the production schedule.

Standard minutes per component or element are broken down into the smallest increments possible. For example, the time to place both ends of a wire may total 0.28 minute—the breakdown might be 0.12 for one end and 0.16 for the other. Elemental times are published this way so the lead operator can determine the time for each circuit around the assembly line. For instance, if the operators were scheduled to make each circuit around 100 basic units in 15 minutes, the time per unit would be 0.15 minute. She could not place both ends of a wire for 0.3 minute without bottlenecking the group. Therefore the lead operator would instruct her to place the first end only, the following operator to place the second.

Lead operator controls the complete assembly operation—instructs and parcels work elements with an eye on standard time for each.

Just one location—If assembly size permits, all operations are performed at the same location. As wiring chassis are completed they are inspected in their fixtures. Rework units are transferred to a rework bench. Production test and calibration is done at assembly line with test carts. Cabinets, cases, or other containers with fasteners are placed on superstructures on the line when basic units are completed.

After a minor rearrangement that moves holding fixtures under the benches, final assembly takes place. Then a packing chart containing all material for packaging is moved to the assembly line and each unit is packaged. Packaged units are transferred to stockroom or to shipping.

HOW THE GAINS ADD UP

Benefits gained from this assembly method include these:

Lower assembly labor cost—It amounts to 35% on two representative products. The cost cutters:

... *Elimination of low production* at beginning of production run. Components are placed in the first unit as quickly as in the last.

. . . *Elimination of rework* due to misplacement of components.

... *Reduction in handling time.* All but the very large units can be built completely in one location.

... *No lost time or added cost* because of absenteeism. Any operator can be assigned to the group at any time, can keep pace right from the start with others. (On conventional progressive assembly lines, one or more standby operators, usually at a higher base rate, are needed to fill in for absentees.)

... *No added cost for relief operators.* Personnel can visit first-aid or rest rooms with no relief operator to fill in.

Smaller space requirements — Bench area is reduced by 65%. Circuit boards and wiring chassis are placed end to end in a row. (Progressive line or single-unit assembly methods generally use a standard 36-in. wide workspace for each unit.) On our first production run three 12-in. circuit boards were placed in a 36-in. area where only one could be accommodated.

Elimination of parts loss—On standard assembly lines or work stations that are constantly stocked, dropped components are usually ignored and left for the sweepers. They're written off as floor shrinkage. Some companies have costly programs to reclaim good parts from floor sweepings. With our method an operator has just enough components for the number of circuit boards or chassis set up in the line. She picks up dropped components.

Better schedule fulfillment—The production rate can be accelerated or decelerated by reducing or increasing the number of operators at any time during a run. This is helpful when parts shortages stop work on an assembly run. Lost time may be made up by adding more operators to complete the run at a faster pace after the missing parts are received. If we want to stretch out a schedule, we merely reduce the number of operators to slow the production rate. Fluctuating monthly schedules, which usually play havoc with conventional balanced assembly lines, are handled easily by changing the number of operators or basic units (or both) on our progressive operator lines.

Higher quality—Mistakes in assembly are reduced. Usual problems (omitted and misplaced components and missed solder joints) are minimized. It's almost impossible for an operator to forget to place one component in each basic unit or where to put it, because she has just the right number of parts to go round. For example, we recently produced an order for 500 galvanometers without one assembly error.

PAY RATES FOR KEY INDIRECT JOBS—IN 9 CITIES

• All figures are average straight-time earnings in manufacturing industries except figures with asterisk, which are for *all* industries. They include incentive pay, if any, but *not* overtime, weekend, holiday, or night-shift premium.

Weekly earnings are average salaries for standard work week.

	MALE JOBS, EXCEPT WHERE OTHERWISE SHOWN	ATLANTA MAY 1958	CHICAGO APRIL 1958	LOS ANGELES-LONG BEACH MARCH 1958	MILWAUKEE MAY 1958	MINNEAPOLIS-ST. PAUL JANUARY 1958	NEWARK-JERSEY CITY DECEMBER 1957	NEW ORLEANS FEBRUARY 1958	NEW YORK CITY APRIL 1958	PORTLAND (ORE.) APRIL 1958
	AVERAGE STRAIGHT-TIME HOURLY EARNINGS									
Maintenance and Powerplant Jobs	Carpenters, maintenance	$2.20	$2.62	$2.60	$2.61	$2.64	$2.56	$2.21	$2.52	$2.77
	Electricians, maintenance	2.60	2.85	2.79	2.76	2.72	2.73	2.57	2.69	2.83
	Engineers, stationary	2.50	2.78	2.78	2.68	2.52	2.87	1.89	2.91	2.63
	Firemen, stationary boiler	1.60	2.20	2.51	2.31	2.28	2.27	1.65	2.41	2.23
	Helpers, trades, maintenance	1.91	2.26	2.28	2.04	2.09	2.03	1.82	2.00	2.12
	Machinists, maintenance	2.42	2.88	2.79	2.90	2.68	2.71	2.52	2.69	2.79
	Mechanics, automotive, maintenance	2.10	2.67	2.63	2.68	2.50	2.64	2.08	2.47	2.49
	Mechanics, maintenance	2.06	2.62	2.60	2.59	2.38	2.65	2.42	2.57	2.72
	Millwrights	2.64	2.76	2.75	2.65	2.62	2.64	—	2.60	2.74
	Oilers	1.59	2.21	2.15	2.34	2.15	2.23	1.84	2.17	2.19
	Painters, maintenance	2.49	2.62	2.54	2.63	2.76	2.44	2.32	2.54	2.79
	Pipefitters, maintenance	2.72	2.83	2.79	2.73	2.76	2.73	2.35	2.55	2.73
	Sheetmetal workers, maintenance	—	2.84	2.77	2.76	2.63	2.67	—	2.58	2.75*
	Tool and die makers	—	3.05	2.88	3.02	2.81	2.75	—	2.78	2.83
Custodial and Material Movement Jobs	Guards	2.26	2.06	2.17	2.05	2.05	2.03	1.95	1.97	—
	Janitors, porters, and cleaners	1.48	1.81	1.90	1.90	1.79	1.83	1.43	1.64	1.84
	Janitors, porters, and cleaners (women)	1.12	1.64	1.77	1.72	1.60	1.64	1.23	1.54	1.59
	Laborers, material handling	1.51	1.92	2.04	2.10	1.95	2.13	1.39	2.00	2.08
	Order fillers	1.46	1.98	1.96	1.95	1.98	1.95	1.24	1.67	2.13
	Packers, shipping	1.53	1.95	2.03	2.10	1.93	1.86	1.31	1.63	1.83
	Packers, shipping (women)	1.32*	1.73	1.91	1.79	1.47*	1.55	.98*	1.59	—
	Shipping clerks	1.89	2.31	2.17	2.21	2.21	2.13	1.71	2.17	2.37
	Shipping and receiving clerks	2.17	2.12	2.26	2.31	2.19	2.24	1.68	2.08	2.19
	Truck drivers:									
	light (under 1½ tons)	1.50	2.56	2.05	2.11	2.38	2.11	1.32	2.12	2.04
	medium (1½ to and including 4 tons)	1.34	2.41	2.42	2.26	2.27	3.08	1.57	2.79	2.26
	Truckers, power (forklift)	1.92	2.20	2.20	2.24	2.04	2.18	1.81	2.32	2.18
	Truckers, power (other than forklift)	—	2.17	2.14	2.18	2.15	1.97	1.58*	2.25	2.28
	Watchmen	1.26	1.77	1.91	1.81	1.89	1.68	1.32	1.63	1.87
	FEMALE JOBS, EXCEPT WHERE OTHERWISE SHOWN									
	AVERAGE STRAIGHT-TIME WEEKLY EARNINGS									
Office, Professional, and Technical Jobs	Comptometer operators	75.00	75.50	79.00	65.50	64.00	68.50	67.50	71.00	70.00
	Draftsmen, senior (men)	105.00	117.00	109.50	110.00	101.50	107.00	110.00	114.50	106.50
	Draftsmen, junior (men)	80.00	84.50	82.50	85.50	80.50	82.50	73.50	77.00	88.50
	Duplicating-machine operators	53.00*	62.50	71.00	64.00	53.50*	61.50*	—	61.00	61.00*
	Key-punch operators	73.50	71.00	75.50	66.50	58.00	68.00	74.50	67.00	60.50
	Nurses, industrial (registered)	89.00	89.00	94.00	83.50	82.50	84.50	83.00	92.50	79.00
	Office girls	48.00*	59.50	59.50	54.00	46.50	53.50	40.50*	51.00	55.00
	Payroll clerks	64.00	76.50	78.50	67.50	64.00	72.50	62.00	75.50	71.00
	Secretaries	81.00	88.50	87.50	85.50	76.00	83.50	79.50	89.00	79.50
	Stenographers, general	70.00	75.00	78.00	68.00	62.00	70.50	65.50	72.50	70.50
	Typists, class A	69.00	72.00	75.00	70.50	58.50	66.00	62.00	73.00	71.00
	Typists, class B	56.00	63.00	67.00	59.00	54.00	58.50	52.00	62.50	60.50

Indirect Wages Rise Again

INDIRECT WAGES are still on the rise, according to FACTORY's latest exclusive report from the Bureau of Labor Statistics, U. S. Department of Labor. Take Chicago, for example: Maintenance and power plant workers there average 14.3¢ more pay per hour than they did just a year ago. Custodial and material movement pay averages 8.4¢ more. Office, professional, and technical pay is up $4 per week in the same city.

To check trends in your own geographical area, see previous BLS studies reported in these issues of FACTORY: June '58; May and August '57; May and August '56; May and September '55.

Rod and Gas Saved

Problems were cost of rod, shielding gas, and rework at jet engine vane-welding operation.

Solution 1—Investigate different types of weld rod. Detailed records of cost, production and repairs proved a change could be made in rod type. Result: a 60% reduction in rod cost, a rework reduction of 70%.

Solution 2—Experiment with the pressure and flow of the inert gas shielding the welding operation. Increase the pressure and decrease the rate of flow by 50% for better welds. Project paid for itself in less than a month.

How to Hit Your Indirect Costs

This sure-fire approach to a hard-to-hit problem will pinpoint the soft spots, guide you to "better-way" methods, produce savings that will add up big in your plant.

OVERHEAD — Every manager wants to pare it down. Every industry knows it as a problem. At Thompson Products we have a three-way system for keeping it under control. We start with engineered standards, develop a budget based on them for all burden accounts, then adjust the budgets when we make a methods improvement. Photos and captions on these pages describe some of the improvements made and savings gained.

Our controls will fit plants of almost every size in a wide range of industry. We apply them in our 13 divisions. These range in size from 100 to 7000 employees, span such diverse fields as jet transportation equipment, farm implement components, castings, and "hi-fi" sets. In our large plants we feel we can afford to refine these controls. In our smaller plants we base them more on estimates. Both ways, we get satisfactory results.

Here, in brief, are the details of our three-way system:

Engineered standards — Not a brand-new idea for overhead. We started to apply them in 1955, now have varied coverage in all divisions. We cover some functions better than others. For instance, we study tool consumption thoroughly, materials handling much less, maintenance somewhere in the middle. Operations we haven't studied have been estimated on engineering principles. This is a big improvement over our old method of flexible budgeting based on estimates and past history.

Accounting department reports—They are an important key to cost control. Our industrial engineers use them to spot prime targets. We base all accounting data on our engineered standards, so the final reports make sense to our industrial engineers and factory supervisors.

Realistic budgets—We automatically revise budgets with each change in method or procedure. Off-budget conditions are reflected in accounting reports, and industrial engineering analyzes them. If a condition merits active engineering control, our engineers go into the plant to find a better way. They also help factory supervisors find ways to improve performance.

We approach our costs two ways:

. . . *Standard costs* are used to price inventories and compute profits.

. . . *Budget standards* start out the year identical to standard costs. But as the year progresses and methods improvements are made, budget standards are reduced to reflect actual operating conditions. At the first of the next year, standard costs are brought into line with current budgeted costs, inventories are repriced, and the system starts over again. This whole accounting method is based on and has its roots in the engineered standard.

By A. E. STUKEY, Supervisor
Budgets and Standards, Tapco Group
Thompson Products, Inc., Cleveland

Tool Costs Attacked Five Different Ways

Ninety per cent of tooling expense, the records showed, could be traced to only 10% of tools used. With cost narrowed this way, we went to work. Production employees gave us data about tool usage, tool life. Number of grinds per tool was established by etching an identifying mark on a sample of tools whenever they were sharpened. The number of grinds was counted when the tool was ready to be scrapped.

Findings of the investigation:

. . . *Expensive drills were broken* every day on a simple operation. Detective work proved these drills had been quenched by forge operators to check dimensions. Solution: Put some dye in the quench tank. Now all colored forgings are annealed before use. Breakage problem is solved. Savings: $270 per month.

. . . *Too-frequent tool changes were traced* to a dimension problem. Because tolerance wasn't being held consistently, the inspector was demanding frequent changes. Solution: Study the process. Study showed a smaller drill was the answer. Savings: $528 per month.

. . . *Expensive upsetting punches were breaking* at the set-screw recess on the shank. Solution: Redesign the punches. Savings: $300 per month.

. . . *Taps were a big expense item.* Solution: Call designers in. Their job: Redesign for greater life. Savings: $1250 per month.

. . . *Breakage of a particular die turned out* to be the result of jamming of the press when a particular stock was run. Reason: Irregular thickness. Solution: Inspect incoming stock for thickness, add insurance by installing a limit switch to stop the press if it jammed. Savings: $250 per month.

Finally, we've made all the data collected in this study available to tool control to aid in planning requirements. And we've used the data to establish our tooling budgets.

Set-up Cost Trimmed

Account analysis in one large division turned up some facts about overhead:

. . . *Set-up, tooling, rework, and supervision* produced 64% of division overhead. All other overhead was scattered over 60 other accounts.

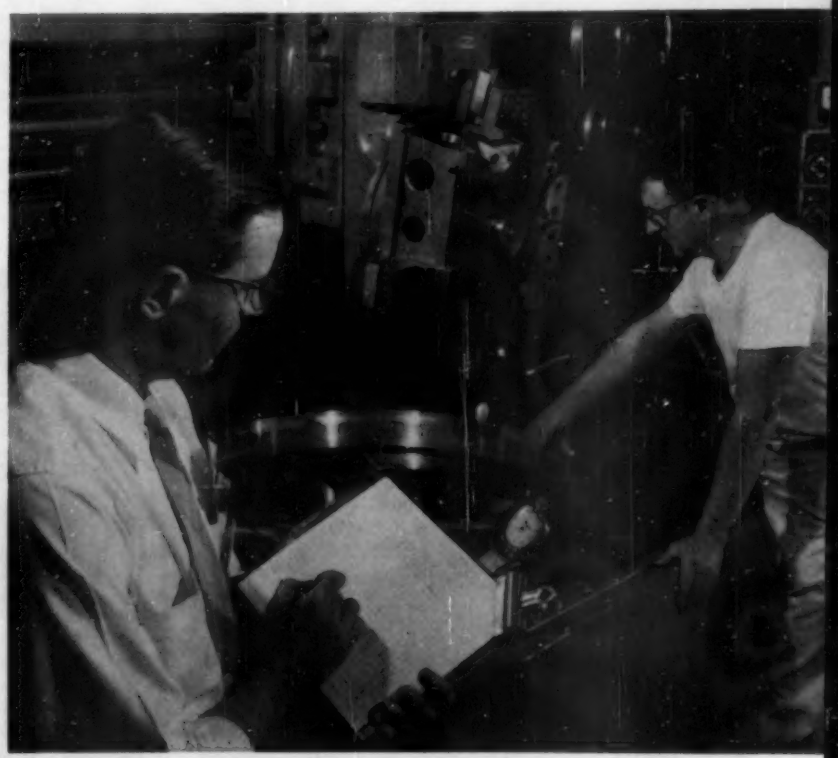
. . . *Set-up expense* was highest in the rotor section.

. . . *Vertical turret lathes and broaches* produced 74% of the rotor section's set-up expense.

This information pinpointed set-up as a key expense. So we launched a four-step attack:

1. Correct the obvious "little things" that become major blocks of expense. Save time by enforcing the rule, "Tools are to be returned to cribs after use." Securely fasten small parts to fixtures before storage to prevent loss. Move heavy fixtures to storage racks near machines. Paint identification numbers in large letters to make fixtures easy to find. Save waiting time by ordering tools in advance. Save working time by careful teardown of old set-ups to keep components that need not be changed. Aid efficiency by standardizing set-up sequence-and-motion patterns.

2. Timestudy set-ups of vertical turret lathes and broaches to get element data. Use the element data to develop partial and complete set-up standards for each part. Prepare description of each set-up for floor use. This tells job-setter what to do, how long to take.



3. Plan set-ups to take advantage of production lot sizes. Take advantage of partial set-ups. Develop budget standards based on time, labor rate, number of set-ups.

4. Put control into effect with first monthly budget report from accounting. Report tells how labor was performed to keep set-up cost under control, how effectively production control kept number of set-ups under control, how industrial engineering lowered set-up costs.

Results—In five months we saved $12,900 in set-up costs. The engineering study cost $7000. Our net: recovery of costs in three months, and enough data to perpetuate a monthly saving of $2380.

Turn the page

Begins on page 114

Scrap and Rejects Reduced

Problem—High scrap of frozen-mercury cast jet-engine vanes.

Approach—Go to the records to find the best starting points. Study showed 30% of rejects were due to nicks, scratches, gouges, etc., caused by handling. Balance of defects was mainly due to grinding and broaching operations.

Solutions—They're manifold:

. . . *Build lazy susans* (photo) to hold vanes at inspection table without touching.

. . . *Coat handling baskets* with plastic.

. . . *Change operator practices,* even at the expense of slowing work, to permit only one vane in a hand at any one time.

. . . *Cover benches* with rubber mats.

. . . *Repair warped fixture* found to be causing trouble at one of the operations.

. . . *Shift process average* on another operation to maximize production of good parts.

. . . *Study capability* of all processes involved, then budget unavoidable scrap to assist in control.

Result—Project paid for itself in one month. Scrap reduced 65%.

Inspection Costs Cut

Records showed inspection as a big money-taker in producing automotive valves.

First step—Make a record of the frequency and extent of process and final inspection. Add process information to complete the picture.

Next step—Decide how job ought to be done. (In this case some process inspections were eliminated, others reduced in frequency.) Eliminate duplications of final inspection. Finally, timestudy the required inspections, establish a budget to control expense.

Result—Costs cut 12%. Pay-out in 3½ months.

Trucks Scheduled to Trim Costs

Problem—High-cost of trucking service.

First step—Establish points where trucks are required, type of truck needed, and quantity of valves involved. Take work samples to establish percentage of idle truck time. Also find out how often trucks use routes other than those specified.

Next step—Reassign truckers to utilize their time better. Instruct each truck operator to follow standard routes, pick up a standard load. Relate trucking requirements to production quantities to develop area budgets for trucking expense.

Result—Supervisor has sound basis for operating. Costs are down 7%. Project paid out in a month.

Are YOU still using pallets?

Many plants have solved their material handling problems by using the Cascade method—without pallets. You don't have to put up with expensive pallet handling any longer. With Cascade Lift Truck Attachments, you switch over—quickly, easily, and economically—to a modern, palletless operation. There's a versatile, cost-cutting Cascade Attachment for every materials-handling job.

With the Cascade Cased Goods Grab, equal distribution of clamping pressure keeps cases in uniform alignment. Stops damage, saves space.

Cascade Bale Grab Arms on the Cascade Load Grab provide efficient palletless handling of baled goods, bundles or boxes.

Clamping and rotating functions are combined in the Cascade Paper Roll Grab, to make a single paper roll handling unit of utmost versatility.

SEE HOW THE *Cascade*

LOAD-GRAB® SYSTEM can make important savings for you

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Literature and information available through the following manufacturers and their dealers.

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Automatic Transportation Co.	Lewis-Shepard Products, Inc.
Baker-Raulang Co.	Mercury Mfg. Co.
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Champ Corp.	Moto-Truc Co.
Clark Equipment Co.	Raymond Corp.
Elwell-Parker Electric Co.	Towmotor Corp.
Hyster Co.	Transtier Truck Co.
Knickerbocker Co.	Yale & Towne Mfg. Co.

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The Cascade Load Grab with Rubber Faced Grab arms for easy palletless handling of smooth-sided boxes and crates.

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Manufacturers of a Complete line of hydraulically actuated lift truck attachments

EQUIPMENT NEWS

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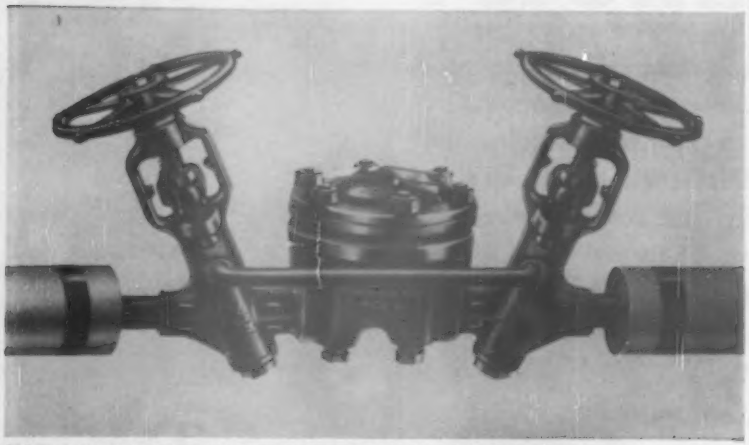


YOU CAN BY-PASS WORK IN BY-PASS PIPING USING THIS . . .

Two-Joint Steam Trap Unit

Imagine—only two joints to make when you use this unique valve assembly for steam trapping. Only two joints—instead of the minimum 24 joints (count 'em) required in a conventional steam trap by-pass. So you can expect slashes in the cost of layout work. You can count on big labor savings in installation. And more labor savings in maintenance—whenever a steam trap is down for repairs. We suspect you'll find still further use for the device in your plant—since this same by-pass valve arrangement can be tailored to exact dimensions for any instrument installation.

Seven devices used in a conventional steam trap hook-up are combined in the single basic unit known as "Piping King": steam trap, four shut-off valves, strainer, and check valve—plus unions and connecting nipples. With the old way, it added up to 18 fittings and 24 joints. With only two joints in the new "Piping King," you can install it in just one-half hour. And it can be installed in all positions—remains freezeproof in vertical position.

All traps and valves of the "Piping King" assembly are carbon or alloy steel forgings. Valves can be welded at any specified angle at no extra cost. The four-purpose steam-trap valve vents air, keeps steam in, discharges condensate, and acts as a check valve. Connections are ½-in. up to 2-in. screwed, socket, butt weld, or flanged ends. Pressure ranges are up to 2500 psi.—maximum temperature is 1150 deg. F.

Velan Steam Specialties, Inc. (Circle 101, Reader Service Card.)

102—"Sealed Skin" is a new flexible metal conduit that's liquid-tight. Tough hide of PVC over metal core resists oil, dirt, chemicals. Comes in sizes ⅜- to 4-in., in handy "playout" carton; is easily cut to proper length on job. International Metal Hose Co.

103—Magnetic Proximity Switch is armless, leverless, and shaftless. It's energized by a separate metal vane passing through a recessed slot in the enclosed switch. Single-pole, single-throw device is rated 115-v. a-c and meets JIC requirements. General Electric Co.

104—Giant Waste Container, the truck-mounted Dempster-Dinosaur, has up to 40-cu.-yd. capacity for loads to 30,000 lb. These detachable containers also have potential use as cargo carriers, for short hauls of raw materials and finished products. Dempster Brothers, Inc.

105—Compact "Circuitpak" is a low-cost hydraulic power unit with electric motor, hydraulic (oil) pump, valves, and oil reservoir. Unit is manifold-circuited for direct connection to power cylinder lines. Four models, pressures to 1000 psi. Brown & Sharpe Mfg. Co.

106—Valve-Cylinder Combination unit combines a conventional single-acting cylinder with a 3-way solenoid valve. Resulting integral power unit is quickly and easily connected into electrical sequence circuit for wide use with jigs, fixtures, etc. Airmatic Valve, Inc.

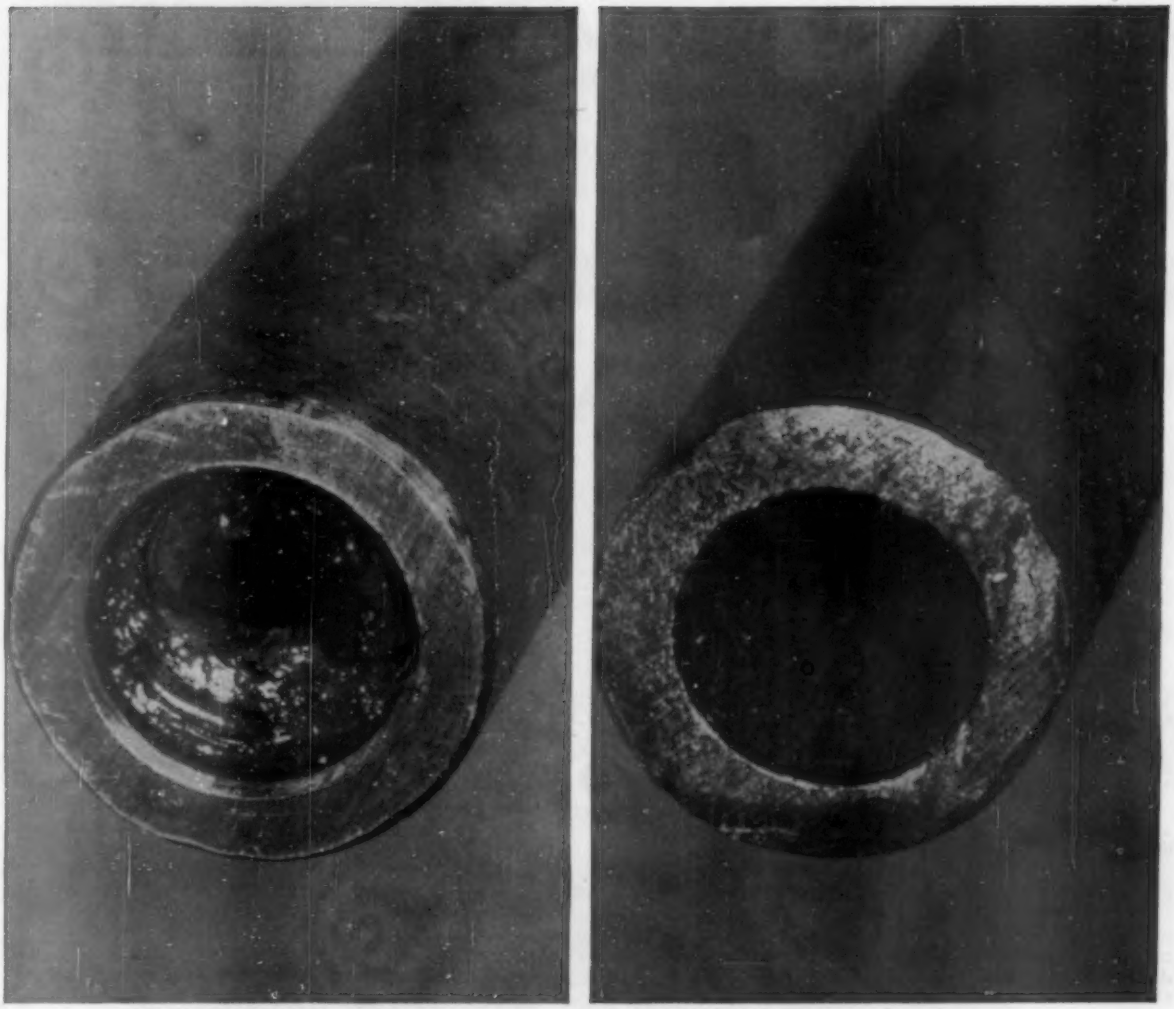
107—Vape-Sorber is a hydrocarbon vapor adsorption device that provides clean, dry air and gas for users of pneumatic instruments and tools. Available in 14 standard sizes—11 for normal pressure applications, 3 for high pressure applications. Selas Corp. of America.

108—Desk-Top Electric Collator compiles multi-page plant reports at rate of 120 pages—or 20 six-page sets—per min. As mimeo or other sheets emerge from the six bins, operator just grasps and stacks them, reaches for next set. Costs about $150. Thomas Collators, Inc.

109—Build-Your-Own Ovens for variable heating jobs are quickly set up by stacking 24x12x6-in. infrared heating modules into changeable layouts. Modules use formed resistance wire elements—no bulbs or tubes—to give immediate, even heat. Infrared Systems.

110—"Sportatron" Cage permits a variety of group games in a small, enclosed plant area—without fear of broken windows. Cage takes up only 12x24 ft., may be used indoors or on roof or parking area—for volleyball, tennis, or golf practice. Sportatron Co. of America.

Turn the page



This sludge-clogged hydraulic line . . . looked like this, after cleaning with a Sunvis 700 oil.

With Sunvis 700 oils, you can clean hydraulic systems and keep them clean

Sludge, caused by high temperatures, and by water, dirt, cutting oils, paint, packing, and by many other contaminants, clogs lines and cuts efficiency.

Sunvis* 700 oils keep these contaminants in suspension, and carry them away to the filters, thereby keeping systems clean and preventing costly shutdowns. In fact, many seriously fouled systems can be cleaned and kept clean permanently by a switch to Sunvis 700 oil. A single charge of Sunvis 700 oil can keep even a continuously contaminated system running smoothly for months, often *years*.

Your Sun man knows Sunvis 700 oils inside out. He has facts, figures, and case histories that prove their quality... quality that means *money in your pocket*. Call him in soon. Or write to Dept. F-9.

Industrial Products Department

SUN OIL COMPANY, Phila. 3, Pa.

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In Canada: Sun Oil Company Limited, Toronto and Montreal

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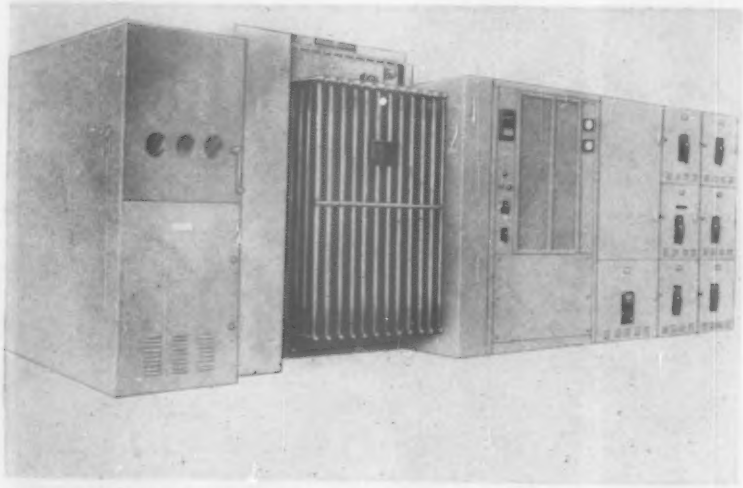


NEW A-C TO D-C SUBSTATIONS CUT POWER LOSSES AS . . .

Silicon Rectifiers Hit Big Time

Silicon rectifiers have reached the Big Time. New line of silicon rectifier d-c unit substations shown here supplement or replace mercury arc units for plants needing large amounts of 250- or 125-volt d-c power—to run cranes, elevators, machine tools, and for similar uses.

Each substation includes incoming line section, high-voltage primary oil-filled transformer, silicon rectifier section, and d-c switchgear section. Units are available for all standard primary voltages from 2400 to 13,800 volts. They are rated for d-c outputs of 250 to 1000 kw., 250 and 125 volts.

G-E engineers say these substations will operate continuously at 100% load, for two hours at 125% load, or for one minute at 200% load. Conversion efficiency at full load is approximately 96% including all losses.

The unit is automatically shut down in case of such abnormal conditions as a-c undervoltage, insufficient cooling-air flow, rectifier transformer over-temperature, or failure of two series groups of rectifying cells in one branch of the circuit. Automatic voltage regulation can be included in the d-c unit substation to maintain uniform output voltage at all loads despite plus or minus 5% supply voltage variations.

General Electric Co. (Circle 111, Reader Service Card.)

112—Magnastat Soldering Iron uses magnetic force to maintain constant temperature of iron near 700 F. Special alloy section in soldering tip changes its magnetic qualities with temperature changes and controls the current flow. Three models. Weller Electric Corp.

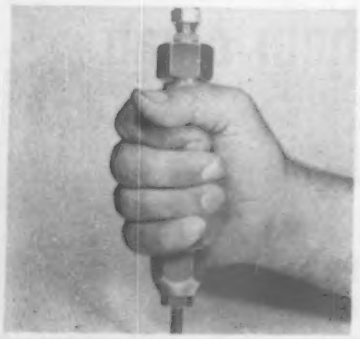
113—Electronic Counter stops, starts, recycles machinery at predetermined counts—controls flow at speeds over 100 units/sec. Individual plug-in decades let you expand Tally-Count from a 2-decade to 3- or 4-decade counter with no wiring change. Standard Instrument Corp.

114—Air Filter Service Switch can accurately sense when it's time to change air filters in plant heating and cooling systems, and at once turns on a warning light. Switch weighs 5 oz., is rated 0.25 amp. at 26 volts a-c or d-c. Bacharach Industrial Instrument Co.

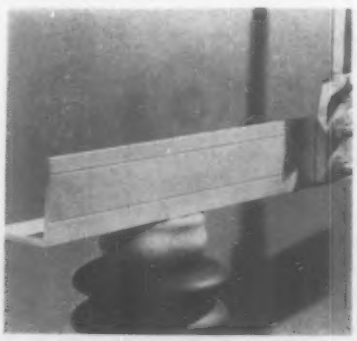
115—Two-Stage Regulator, combining magnetic and electronic amplifiers, has wide application on adjustable-voltage d-c drives and for voltage and current regulation in speed, tension, position, and similar systems. Three compact sizes, 5-36 amp. Clark Controller Co.

116—Low-Cost Platform Conveyor can be installed between floors, into basements or over stairways for the movement of 1-ton loads. No shaft or special floor reinforcement is necessary; push-button control stations are located at each floor level. M-B Corp.

117—Miniature Photoheads, about the length of a pen-light battery, are designed to solve the problem of mounting a photoelectric sensing device and lamp in a limited area. The manufacturer claims an average light source life of 5000 hours. Post Electronics.



118—Spot Glue Gun shoots a circular spot of glue on any flat, hard surface. Guns, made for spot sizes ¼- to 1-in. dia., are available for manual or mechanical use in bag tacking and varied production work. Gun handles all low-viscosity, cold glues. John P. Fox Co.



119—Universal Angle Bus conductor allows direct bolted connection from cable to bus. Twin grooves on outer surfaces and single grooves on inner surfaces serve to locate center lines for drilling holes to make tap and support attachments. Aluminum Co. of America.

120—Power Paint Remover and surface cleaner is a light, portable electric tool for quick removal of paint and varnish, rust and scale. Tool offers controlled disk sanding, using tungsten carbide disks. Gives smooth, uniform finish without gouging. Porter-Cable Machine Co.

Turn the page

Weldynamics

ARC WELDING AT WORK CUTTING COSTS

New Shielded Arc Automatic Welding

Speeds to 180 ipm!

on 14 gage steel

No Flux or Gas

with

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Innershield—an ultra-high speed automatic welding process. No loose flux or gas! Shielding material is in the wire. Produces welds of shielded arc quality consistently at speeds as high as 180 inches per minute. For steels ranging from light gage to ¼" thick.

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The World's Largest Manufacturer of Arc Welding Equipment

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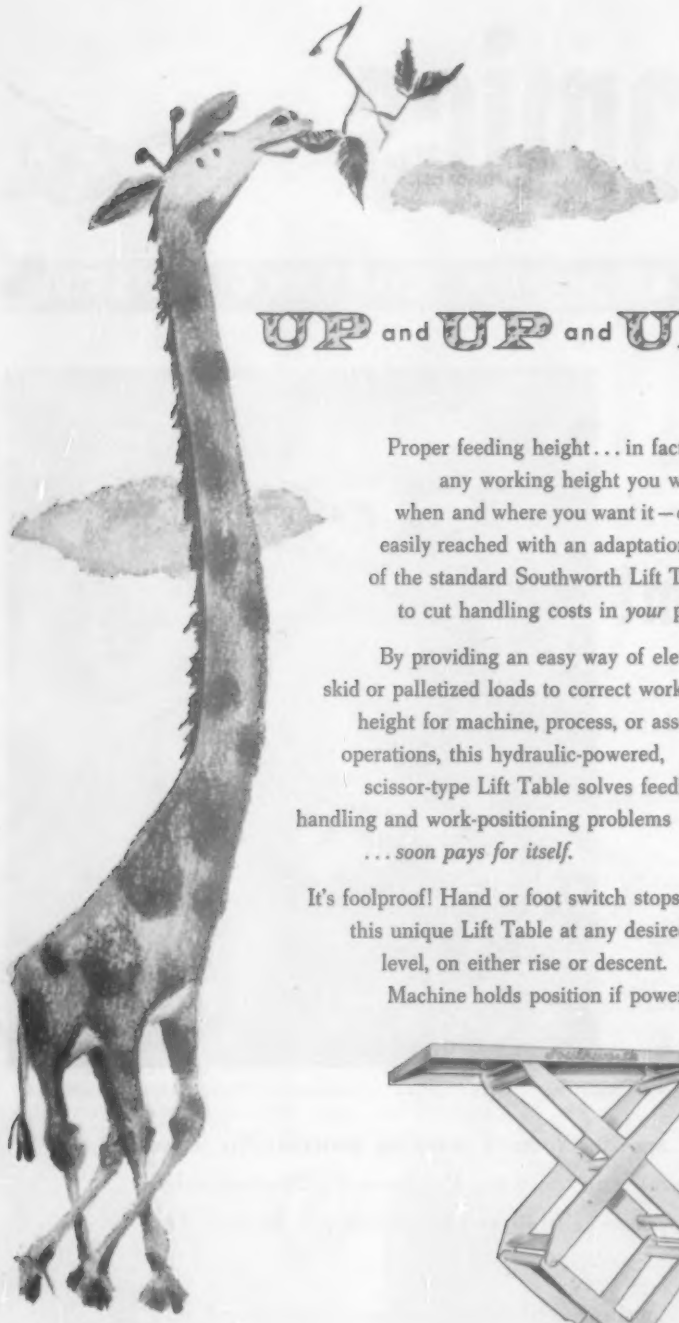
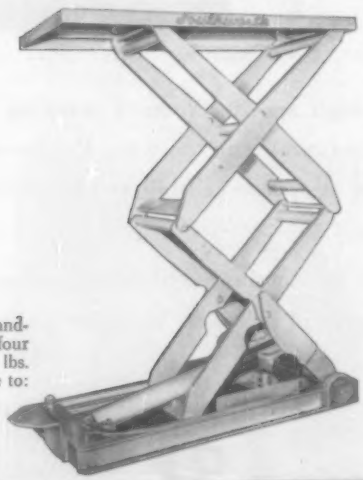


UP and UP and UP

Proper feeding height . . . in fact, any working height you want — when and where you want it — can be easily reached with an adaptation of the standard Southworth Lift Table*, to cut handling costs in *your* plant.

By providing an easy way of elevating skid or palletized loads to correct working height for machine, process, or assembly operations, this hydraulic-powered, scissor-type Lift Table solves feeding, handling and work-positioning problems *. . . soon pays for itself.*

It's foolproof! Hand or foot switch stops this unique Lift Table at any desired level, on either rise or descent. Machine holds position if power fails.



Double scissor-leg Table, adapted from a standard LH model. For further details on our four Series of Lift Tables, capacities from 500 lbs. to 24,000 lbs.; vertical travel to 64", write to:

*PATENT PENDING

SOUTHWORTH LIFT TABLES

a division of SOUTHWORTH MACHINE CO., 349 Warren Ave., Portland, Me.

FACTORY / EQUIPMENT NEWS

Begins on page 118

For more about these items, circle item numbers on Reader Service Card next to back cover.

121 — Conductor Identifier unit can identify up to four unmarked conductors simultaneously. Transmitter sends out four separate coded signals, one for each conductor. Operator with receiving lamp at distance can quickly identify each conductor. J. W. Dice Co.

122—Jib Master is a self-supported jib crane which can be rotated a full 360 deg. providing hook coverage over large floor area. Units for use with either chain block or electric hoist; capacities to 6 tons, boom lengths to 20 ft. Borg-Warner Industrial Cranes.

123—Noise Control Unit for air conditioning and ventilating systems is circular-shaped—for easy installation in round duct systems. No transition sections are needed. Units are available in 6- to 60-in. dia. and 4- to 10-ft. lengths. Industrial Acoustics Co., Inc.

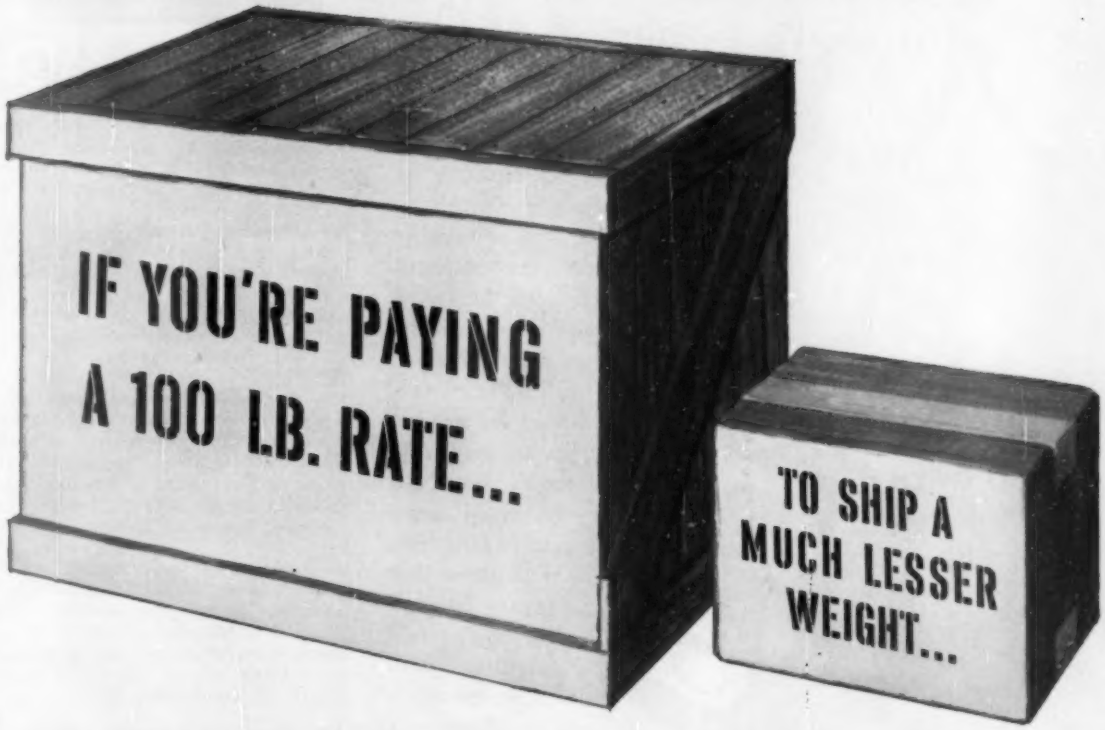
124—Fork Lift Truck designed to operate over rough terrain has 6000-lb. capacity and features four-wheel drive, power steering, power booster brakes, and tilting telescopic tower. Truck's 6-cyl. diesel engine develops 85 hp. at 2000 rpm. Lull Engineering Co.

125—Pac-Vac Cleaner that straps to operator's back can be used for regular floor cleaning using up to a 22-in. tool, or for all types of overhead work with extension handles. It's handy for bins and stairs, congested areas, under fixed seating. Breuer Electric Mfg. Co.

126—Efficiency Recorder can be attached to any machine or process. Graphic line on cylindrical chart records productive time and downtime. Optional read-out counter in base gives accumulated total operating minutes and number of times stopped. Gorrell & Gorrell.

Turn the page

SHIPPERS



THEN YOUR SHIPPING DOLLAR IS BEING "TAKEN FOR A RIDE"

Some airfreight and truck carriers today advertise so-called "bargain" rates which actually impose *higher* minimum weight charges and mean *less* service. Be sure you compare Railway Express rates *and service* before you ship with any other carrier.

HERE ARE DOWN-TO-EARTH FACTS ON RAILWAY EXPRESS SERVICE

Widest Coverage— Railway Express serves some 23,000 communities to give you mass distribution—with *one company responsibility*. You can reach *every* major market in the U. S., and with Railway Express World Thruway Service—most every major market abroad. No more worries about delays and divided responsibility in transferring between two or more carriers.

Special Low Rates— You get door-to-door delivery, at no additional cost within REA vehicle limits. What's more, Railway Express offers special low commodity rates on ready-to-wear merchandise, graphic arts materials, hosiery, shoes, drugs, import-export traffic and many other categories. Call your nearest Railway Express Agent. He'll tell you why—

RAILWAY EXPRESS AGENCY

THE BIG DIFFERENCE IS RAILWAY EXPRESS

For more facts circle 519 on Reader Service Card

Instant Voice Contact

with key personnel

Here is a powerful new communication tool for industry that speeds efficiency. Key roving personnel can always be contacted. At the touch of a selector button, a tone sounds in the paged Handie-Talkie® Radio Pager, followed by a *voice message*—transmitted directly to the person paged, and to him only. With these tiny transistorized "Radio Pagers," executives, foremen, maintenance men are all instantly available, wherever they go in or near plant and office. Learn more about Motorola's new Handie-Talkie "Radio Pager."

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FACTORY / EQUIPMENT NEWS

Begins on page 118

For more about these items, circle item numbers on Reader Service Card next to back cover.

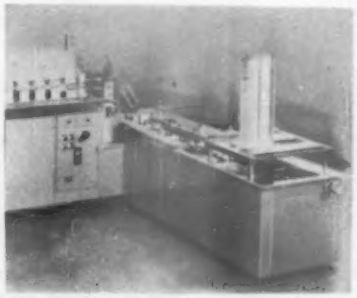
127—Plastic Goggle for protection against splash, spray, and flying particles is recommended for workers in chemical plants and other humid conditions. Light, comfortable goggle is indirectly ventilated to be fog-free. Gives wide-angle vision. American Optical Co.

128—Chipping Hammer has a rubber-bonded "shock-absorber" nozzle and a controlled power valve to allow tailoring power of the hammer to the exact job requirement. New tool is said to absorb chisel vibration and substantially reduce the noise level. Ingersoll-Rand Co.

129—Fork-and-Boom Attachment doubles the function of maker's high-lift fork trucks. Permits them to serve as crane trucks handling bulky non-palletized materials in plant or yard. New boom attachment extends 30-60 in., holds 2 tons or more. Automatic Transportation Co.

130—"Portaflare" is a portable, motor-driven tool for flaring tubing easily and accurately in the shop or field—wherever d-c or 60-cycle a-c, 115-v., electric power is available. Tool may be clamped in a bench vise or hand-held, as required. Parker-Hannifin Corp.

131—Quiet Bin Vibrators can be installed on bins and hoppers of up to 14-cu.-ft. capacity to assure smooth flow of material that might otherwise pack in bins or chutes. Unit requires no rectifier; works directly from 50- or 60-cycle a-c. Three models. Eriez Mfg. Co.



132—Vertical Cartoner, semi-automatic, is simple to operate and easy to adjust. Vertuck 120 maintains cartons under continuous mechanical control, offering easy access for filling by several operators. Unit delivers up to 120 cartons per min. Bivans Corp.

133—Roller Conveyor Kit provides conveyor sections you can assemble in a few minutes with a wrench. Straight and curved sections available in 5- and 10-ft. lengths, 12-, 16-, 20-, and 24-in. widths. Capacity per section is 120 lb./ft. Mechanical Handling Systems, Inc.

Turn the page

WHAT'S THE PRICE OF SNOW?

Did you ever figure how much you spend to have a man shovel snow or spread chemicals? And what about accidents, too? You pay a heavy price if someone hurts himself on your premises.

A SPANGRID snow melting system is a perfect way to keep your driveways, loading docks, walks and ramps clear of snow and ice—without the constant headache of keeping a special crew to do the job. SPANGRID is especially suitable for use in snow melting, radiant heating and refrigeration systems. Because SPANGRID is *quality-controlled* from skelp to finished product, you can be confident that you're getting a *top-quality* pipe.

Make it steel . . . Make it SPANGRID; have your contractor get started on your snow melting system now. And for best results . . . specify SPANGRID.

Send for this FREE BOOKLET

"Snow Melting Systems." It tells you all about snow melting . . . its cost, its installation and maintenance, and how it benefits you. Write to us, or to your local SPANG Distributor for your free copy.

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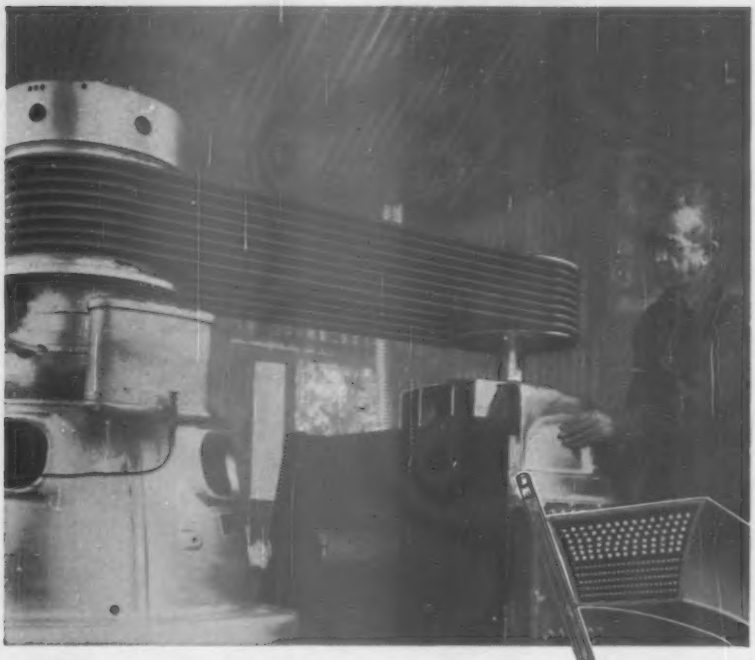
DIVISION OF THE NATIONAL SUPPLY COMPANY
GENERAL SALES OFFICE:
TWO GATEWAY CENTER, PITTSBURGH, PA.

SPANGRID* STEEL PIPE
* TRADEMARK

District Offices and Sales Representatives in Principal Cities

For more facts circle 521 on Reader Service Card

No. 1 choice of industry...



the V-belt with concave sides

It is easy to see why concave sides insure far longer belt life... and make Gates the industry's first choice in V-belts.

Just make this simple test: Bend a Gates V-Belt with concave sides (Fig. 1) as if it were going around a sheave. Feel how the sides fill out... become perfectly straight (Fig. 1-A).

Fig. 1

Fig. 1-A

Note how this belt makes full contact with the sides of a sheave... grips the sheave evenly, distributing wear uniformly across the sides of the belt. Uniform wear lengthens belt life — keeps costs down.

With a straight-sided belt the sides bulge out on the bend and wear is concentrated on the bulge. Uneven wear shortens belt life — increases belt costs.

Because Gates V-Belts with concave sides are so universally preferred, they are also the **most widely available.** There are Gates distributor stocks in industrial centers throughout the world.

The Gates Rubber Company, Denver, Colorado

Gates *World's Largest Maker of V-Belts* TPA 313

Gates VULCO ROPE Drives

FACTORY / EQUIPMENT NEWS

Begins on page 118

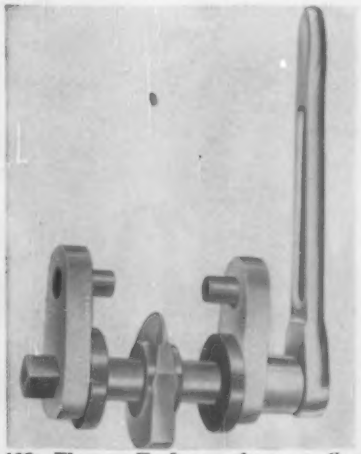
For more about these items, circle item numbers on Reader Service Card next to back cover.

134 — "Little Windy" Airvac cleans electrical switchboards, control panels, and the like without power shutdown. Air-operated vacuum operates on Venturi principle, fits standard air hose. Many accessories adapt it for varied wet and dry pick-up jobs. M-M-A, Inc.

135—Small-Parts Stamping machine features automatic spacing and alignment of work. Operating lever delivers up to 2-ton pressure to mark in hard materials such as stainless. Lightweight, hand-operated, and electric keyboard models available. Defiance Machine & Tool Co.

136—Inspection Table combines an even vibratory feed, adjustable belt speeds, and a variable center drop to speed up small parts inspection. Inspection of 55,000 small parts or 12,000 large parts per hour is said to be a usual rate. G. F. Goodman & Son.

137—Hydraulic Drain Flusher attaches to ordinary hose to clear drains in a hurry. "Drain Demon," made of flexible canvas, expands within drain to force a hydraulic thrust against the clogging mass. Five sizes fit 1½- to 6-in. drains. Associated Specialties Co.



138—Flange Tool speeds spreading flanged pipe connections in small working space. Tool is anchored by inserting pins into flange bolt holes and circular cam wedge into opening between flanges. Pressure by ratchet handle quickly spreads flange. Wm. L. Riggs Co.

139—Static Frequency Converter, boasting low initial cost, high operating efficiency, and negligible maintenance, makes an ideal power supply for many types of induction heating and melting equipment. Multiductor unit fits small floor space. Ajax Electrothermic Corp.

Turn to page 134

Here's the answer to your maintenance problems!

Yes, this is a strong statement . . . but we can back it up with this new fully illustrated FREE booklet which shows in detail the latest Maintenance Management techniques . . . so easy to apply to your present maintenance setup. *It is the most comprehensive and thoroughly practical book on Maintenance Management ever produced for American business!*

The system shown in flow chart form in this book, not only assumes responsibility for repair, construction and preventive programs, but includes proper utilization and scheduling of maintenance crafts and control of ever increasing maintenance inventories. It will assist *large* and *small* firms alike in getting *better work control, better planning, better preventive maintenance, better spare parts control, better worker morale* . . . MORE FOR THE MAINTENANCE DOLLAR!

If you have no maintenance management program now, this book will enable you to plan a program from start to finish – one suited to your exact needs. Or, if you have detected areas of weakness in your present setup, then this book will enable you to quickly analyze and correct those particular weaknesses.

Whatever your responsibility in connection with maintenance in your firm you can't afford to be without this book on Maintenance Management. The potential savings in time and money are tremendous! Send coupon Today!

Remington Rand

DIVISION OF SPERRY RAND CORPORATION

Room 1952, 315 Fourth Avenue, New York 10.

Kindly send free booklet X1820—"Maintenance Management That Produces More For The Maintenance Dollar."

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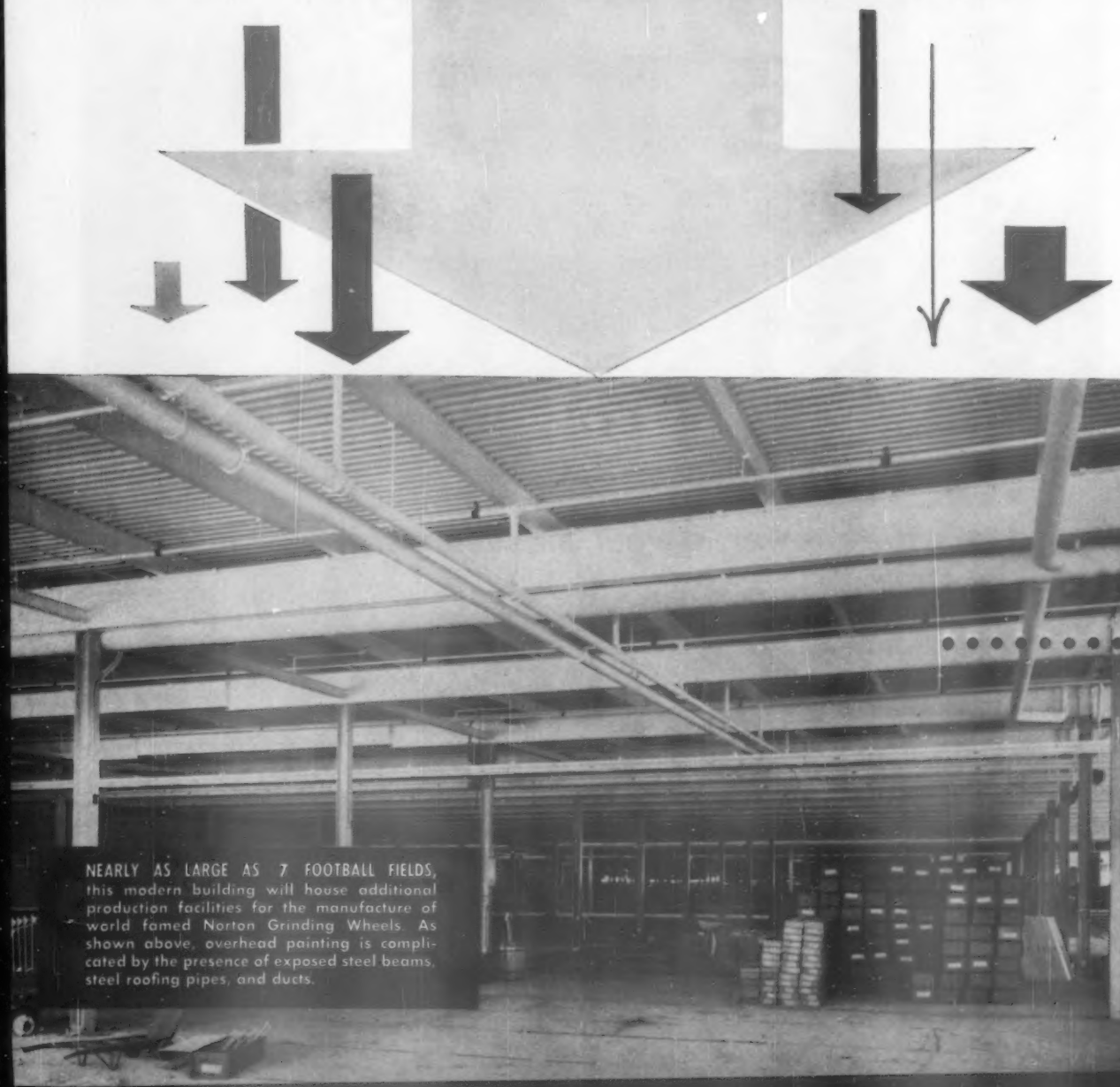
For more facts circle 523 on Reader Service Card

For more facts circle 524 on Reader Service Card ➤

DOWN GOES THE OVERHEAD!

NEW BARRELED SUNLIGHT SUPER HIDING WHITE LIGHTENS THE ILLUMINATION... LOWERS CEILING PAINT COSTS AT THIS NEW NORTON COMPANY PLANT

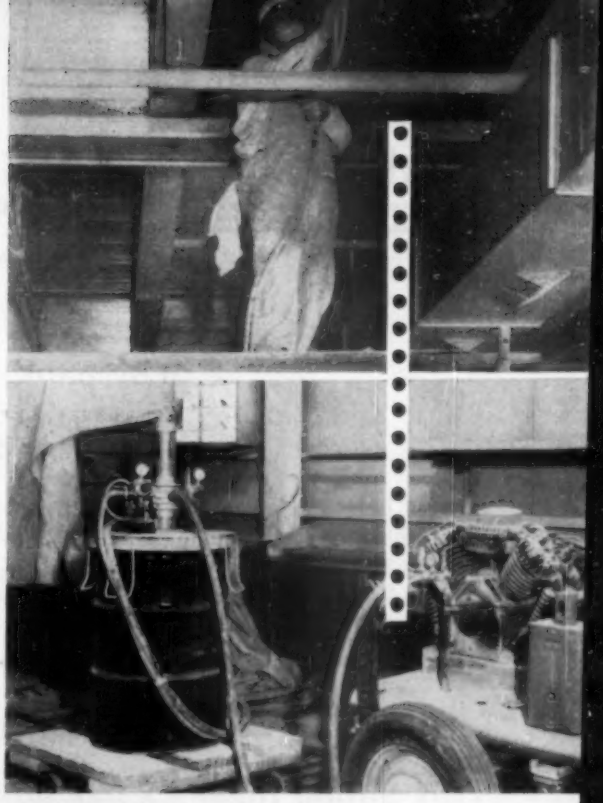


NEARLY AS LARGE AS 7 FOOTBALL FIELDS, this modern building will house additional production facilities for the manufacture of world famed Norton Grinding Wheels. As shown above, overhead painting is complicated by the presence of exposed steel beams, steel roofing pipes, and ducts.

Five acres of overhead — 19 feet high and with a minimum of natural lighting — posed plenty of painting problems for E. J. Cross Company, building contractors for The Norton Company's new grinding wheel plant at Worcester, Massachusetts. Yet they solved them and saved substantially on coverage costs with Barreled Sunlight Engineered Paints.

To bring down the high cost of on-the-job mixing and application, Mr. Richard V. George, Superintendent of Painting, specified ready-for-the-gun Barreled Sunlight Super Hiding White. Using high speed spray guns, his five-man crew applied this engineered paint directly from 55-gallon drums to ceiling areas with a minimum of fog, no runs and perfect results. As reported by Mr. George, "the new Barreled Sunlight Super Hiding White has a better sheen and tighter film. *It looks white even in dark, shadow areas!*"

Lighter, brighter and more economical paint jobs like this do not "just happen". Only through careful planning and the use of Barreled Sunlight Engineered Paints — specially formulated for heavy duty requirements — can you be sure of perfect paint jobs every time. Prove it for yourself by making the famed Barreled Sunlight "On-the-Wall" Test in your own plant. Fill out the attached coupon now for fast action!



DIRECT FROM DRUM TO GUN IN ONE OPERATION!
To speed painting of overhead areas in this giant plant, ready-to-apply Barreled Sunlight Super Hiding Paint is applied with spray guns directly from 55-gallon drums.

Barreled Sunlight Paints

ENGINEERED

FOR A BETTER LOOKING, LONGER LASTING PAINT JOB AT LOWER COST

Send for your free copy of this Barreled Sunlight Engineered Color Catalog now. Contains complete descriptive information plus Color Chip Selection Section.

BARRELED SUNLIGHT PAINT COMPANY
2-I Dudley Street, Providence 1, R. I.

☐ Please contact me soon to arrange an "On-the-Wall" Paint Test at no obligation.

☐ Send me a free copy of the Barreled Sunlight Engineered Color Catalog.

NAME..... POSITION.....

COMPANY.....

STREET.....

CITY..... STATE.....

FACTORY
MANAGEMENT AND MAINTENANCE

IDEAS OF THE MONTH

By LEWIS K. URQUHART, Executive Editor, FACTORY

(For more information, circle item numbers on Reader Service Card next to back cover)

Why paint window glass to keep out heat and glare? There's a vinyl sheeting called Tox-Shade (*Toch Bros.*) that can be quickly squeegeed (no adhesive) to the glass, and as quickly stripped off and stored for re-use. **(291)**

Floor trucks? We never dreamed there were so many different kinds until this morning's mail dumped a new 4-wheel floor truck selector chart on our desk. It describes and pictures 52 types one manufacturer (*Lewis-Shepard*) can supply. There's a standard or a special truck for every job. **(292)**

Your maintenance man won't have to lug a control box around the shop—or drag it up a ladder—if you give him a (*Syntron Co.*) 100% self-contained electric hammer or electromagnetic hammer drill. **(293)**

1104 Sutton Road is a 16mm sound film (*The Champion Paper & Fibre Co.*) that dramatizes today's problem of individual productivity. Offered as a public service. Nothing in the 30-min. film about company or industry. Also available: a meeting leader's guide and a panel discussion trailer. **(294)**

Whether built-in lighting is highly desirable for your product—or just a faint possibility—you ought to own a sketchbook (*General Electric*) that contains 60 ideas for incorporating lighting into a slew of products. **(295)**

Handling coiled strip—steel or tin plate or any other hard-to-handle coiled product—is easy as pie with one of those mobile hydraulic cranes (*Ruger Equipment, Inc.*). They're available in ¼- to 3-ton capacities. **(296)**

Booklet of the month is printed on Texoprint (*Kimberly-Clark*). This is a plastic-coated and impregnated paper that costs more than regular paper. But it's tear-resistant, won't curl, can be cleaned with a damp cloth. **(297)**

For your conference room—one or more of those porcelain-enameled steel chalk boards marketed under the name of Korok (*Enamel Products Co.*). Surface is a glass frit fused with Vitrenamel (*United States Steel Corp.*). Boards can be suspended on rollers, used as sliding doors or partitions. **(298)**

Sky-Hi-Lift transforms an electric fork truck into a dual-purpose machine (*Automatic Transportation Co.*) that can be used not only for high stacking and unstacking but also for loading and unloading tracks and trailers. Mast has collapsed height of 68 in., can lift to 144 in. Free lift, 20 in. **(299)**

Handbook of Accident Prevention (*National Safety Council*) is written for small companies that don't have full-time safety specialists. **(300)**

Circular calculator from West Germany, called Multor (*R/B Crafters*), is pocket-size, does all the things your conventional slide rule can do. It consists of two metal discs in three colors (to speed up and prevent errors in reading the answers) and a sliding arm of transparent plastic. **(301)**

Fringe benefits is the title of a new survey (*Chamber of Commerce of the United States*) that covers 1020 companies. Your chance to find out how your company compares with the average for others in your industry. **(302)**

That live storage rack called Palletflo (*M-H Standard Corp.*) now comes complete with simple lever-controlled system for returning empty pallets to the rear of the rack without any lifting by the order picker. **(303)**

For a perfect lawn next spring and summer, why not install an Aqua-Dial sprinkler system (*Automatic Valve Systems*) this fall? Tailors your plant's watering program to special requirements of lawn, shrubbery, etc. **(304)**

Modernizing? You'll like a simple one-page form (*Jones & Lamson*) that's designed to help you make a comparative analysis of the cost of continuing to operate old equipment *versus* replacement with new. **(305)**

Micro-Mike is an inexpensive inspection and measuring microscope (*DuMaurier*). Pocket-size. Twenty-power. Four-lens optical system. **(306)**

Your safety people will surely crave a (free) copy of "Handbook of Safety Codes" (*Fire Equipment Manufacturers' Assoc.*). Its 42 pages outline procedures for maintaining, protecting, recharging, and inspecting fire extinguishing equipment commonly used in industrial plants. **(307)**

Steel belt conveyor users who like to design their own, will find plenty of help in a new 8-page engineering guide (*Sandvik Steel*). Contains data on dimensions, horsepower requirements, pulley diameters, idler roller spacing, carbon and stainless belts, end joints, inclines, etc. **(308)**

There's a new file (*Charles Bruning*) for large drawings (up to 31x42 in.) that's fireproof and burglar-proof. So why build a vault? **(309)**

Safety clothing, anyone? Then you'll want a new catalog (*B. F. Goodrich*) that illustrates work suits, raincoats, gloves, aprons, sleeve protectors, leggings, hats—of rubber, Koroseal, neoprene, Hycar. **(310)**

More Ideas of the Month in Press Time Report following page 86

Specify REPUBLIC Shelving

...designed, engineered, built to handle every shelving need

...BONDERIZED to provide a fine, long lasting finish

Convert static storage facilities into active inventory and materials movement centers with Republic Steel Shelving and Accessories.

From Republic's patented Wedge-Lock Shelving for handling the heavyweights, to the smallest inserts, drawers, and shelf dividers, Republic can supply the right shelving facilities to meet your specific storage needs.

Strong, sturdy, steel-constructed Republic Shelving can be quickly, easily adjusted without dismantling to meet changing storage needs. Long life is built in. All surfaces are BONDERIZED to resist rust, retard corrosion, and provide better paint adhesion. Finish is baked enamel.

Republic Storage Engineering Specialists will help you apply this superb equipment to your materials movement problems . . . show you how to handle the heavyweights, how to control small parts. Call your Republic representative, or write Republic's Berger Division direct.

ABOVE: REPUBLIC WEDGE-LOCK SHELVING . . . designed to handle heavyweights.

BELOW: WEDGE-LOCK LONG PARTS STORAGE UNITS . . . easy to load, unload from either side.

ABOVE: REPUBLIC METAL LUMBER . . . slotted angle construction meets every framing need in custom built storage facilities.

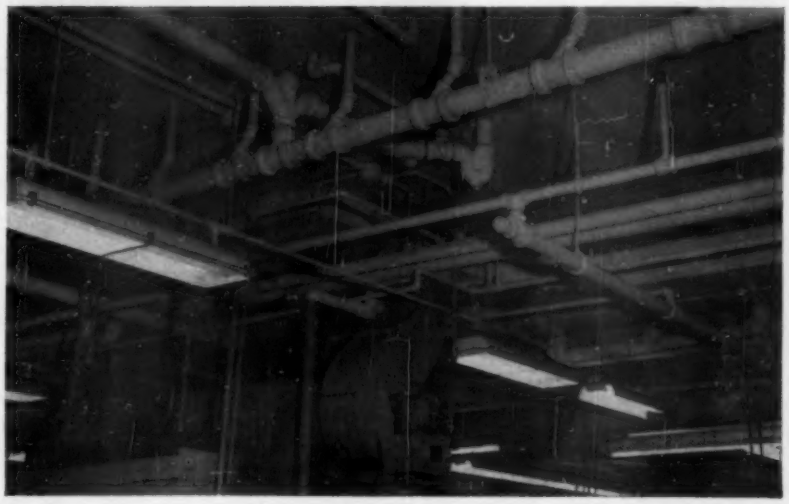
BELOW: INSERTS, DRAWERS, SHELF-DIVIDERS . . . solve small parts storage problems.

For more facts circle Reader Service Card numbers as follows:

REPUBLIC MATERIALS HANDLING IDEAS save space, cut costs, improve inventory control. Here, Republic Box and Skid Units are used in combination with special hoppers designed by Dresser Industries, Wellsboro, Pa. Opening in front of box hooks and locks on hopper. Lift truck operator trips dumping mechanism with truck forks, eliminates idle machine time. Let Republic help solve your materials handling and storage problems. Call or write today.

REPUBLIC ELECTRUNITE® "Dekoron®-Coated" E.M.T. outlasts standard conduit ten to one! Acid fumes from Charmin Paper Products Company's sulfite digesters combined with moisture to corrode standard heavy-wall conduit so badly that it had to be renewed every six months. "Dekoron-Coated" ELECTRUNITE has now been in service nearly seven years. A tough coating of polyethylene encases lightweight ELECTRUNITE E.M.T. in an end-to-end armor that resists excessive moisture and corrosive fumes. Write for data.

REPUBLIC STEEL PIPE provides full efficiency in many types of service lines . . . steam, air, waste, sprinkler systems. Low initial cost and long, trouble-free service provide basic measurable economies. High degree of workability means easy cutting, threading, bending, and welding. See your Republic Pipe Distributor, or send coupon for complete information.



REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. FA-6252
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please supply additional information on the following:

☐ Wedge-Lock Shelving ☐ Wedge-Lock Long Parts Storage Units
☐ Republic METAL LUMBER ☐ Inserts, Drawers, Dividers
☐ Republic ELECTRUNITE "Dekoron-Coated" E.M.T.
☐ Republic Steel Pipe ☐ Materials Handling Equipment
☐ Have Republic Storage-Materials Handling Engineer call

Name _____ Title _____
Company _____
Address _____
City _____ Zone ____ State _____

1 man, on a TENNANT "L" Floor Machine...

removes 140 lbs. of grease-caked dirt in 22½ minutes

As he rides down this aisle on a TENNANT "L" Floor Machine, this man is doing a job you'd think was "impossible."

With no effort except to steer and use simple hydraulic controls, he's cleaning a 21" path . . . smoothly shaving off bumpy traffic-packed dirt at the rate of 140 lbs. in 22½ minutes.

That's a *ton* in less than 5½ hours!

CLEANS FLOOR IN 1 OPERATION

You see the results at the right. In one operation the machine's 1600 rpm cleaning cylinder *pulverizes* hard-packed dirt—then picks it up.

Provides a superbly clean floor at a rate 6 men couldn't equal by hand—a hard, dry, good-trucking surface that wheels can grip without wasted power or lost traction.

WRITE for illustrated bulletin, photos, performance data, traction-test results, etc. Smaller walk-behind machine available for congested areas.

BEFORE: Dirt build-up 1/16" to 1/8" thick wastes power, grabs wheels. Truck needs 28-lb. pull to keep moving.

AFTER: Cleaned by Tennant "L", floor is smooth and dry. Lets truck move with 9-lb. pull—1/3 the effort needed before.

G. H. TENNANT COMPANY
705K N. Lilac Drive, Minneapolis 22, Minn.

TENNANT FLOOR MACHINES

SPECIALIZED MAINTENANCE EQUIPMENT

POWER SWEEPERS • FLOOR MACHINES • SCARIFIERS • ROOF SCRAPERS • CONCRETE ROUTERS

FACTORY / EQUIPMENT NEWS

Begins on page 118

For more about these items, circle item numbers on Reader Service Card next to back cover.

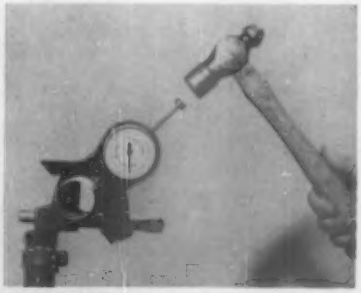
140—Bus Splice Cover constructed of flame-retardant polyvinyl-chloride replaces molded splice boxes and potting compound used for insulating bus joints. Flexible and easy to handle, it comes in sizes and shapes to insulate 1200- to 2000-amp. bus. General Electric Co.

141—Air-Operated Butt Welder produces up to 2500 welds/hr. in semi-automatic operation. Provides fast welding of wire rings, flats and angles, cold-rolled and hot-rolled materials; welds from 1/16- to ½-in. dia. with same jaw setting. Alphil Spot Welder Mfg. Corp.

142—Roof Exhausters available in 70 models combine high air discharge with low-contour appearance. Low look is achieved by locating centrifugal wheel or axial blade in the top of the all-aluminum housing. Capacities range up to 28,650 cfm. Jean-Air Products Co.

143—Mechanical Dock Ramp (8x6 ft.) is powered by the back-up push of heavy trucks moving into loading position against the dock. It withstands "crash" impacts, has a load capacity of 10 tons; may be installed in dock recess or projected outward. Globe Hoist Co.

144—"One Shot" Clutch for fastening tools is a new torque control unit that provides great accuracy in controlling torque limits within range of 20 to 100 in./lb. When adapted to existing fastening tools, unit adds less than 1 in. to tool length. Buckeye Tools Corp.



145—Three-in-One Gage for machinists is a versatile tool that sets angles, locates centers, and levels surfaces. Self-contained gage with its magnetic base does the work quickly, simply, accurately—leaving both hands of user free for adjusting. Brite-Line Corp.

146—Mercury Pushbutton Switch especially adaptable to dry circuitry work, has no contact bounce or chatter. Operation involves trapped pools of mercury slid in and out of contact. Switch can be mounted in any position. Electrosonic Engineering Co., Inc.

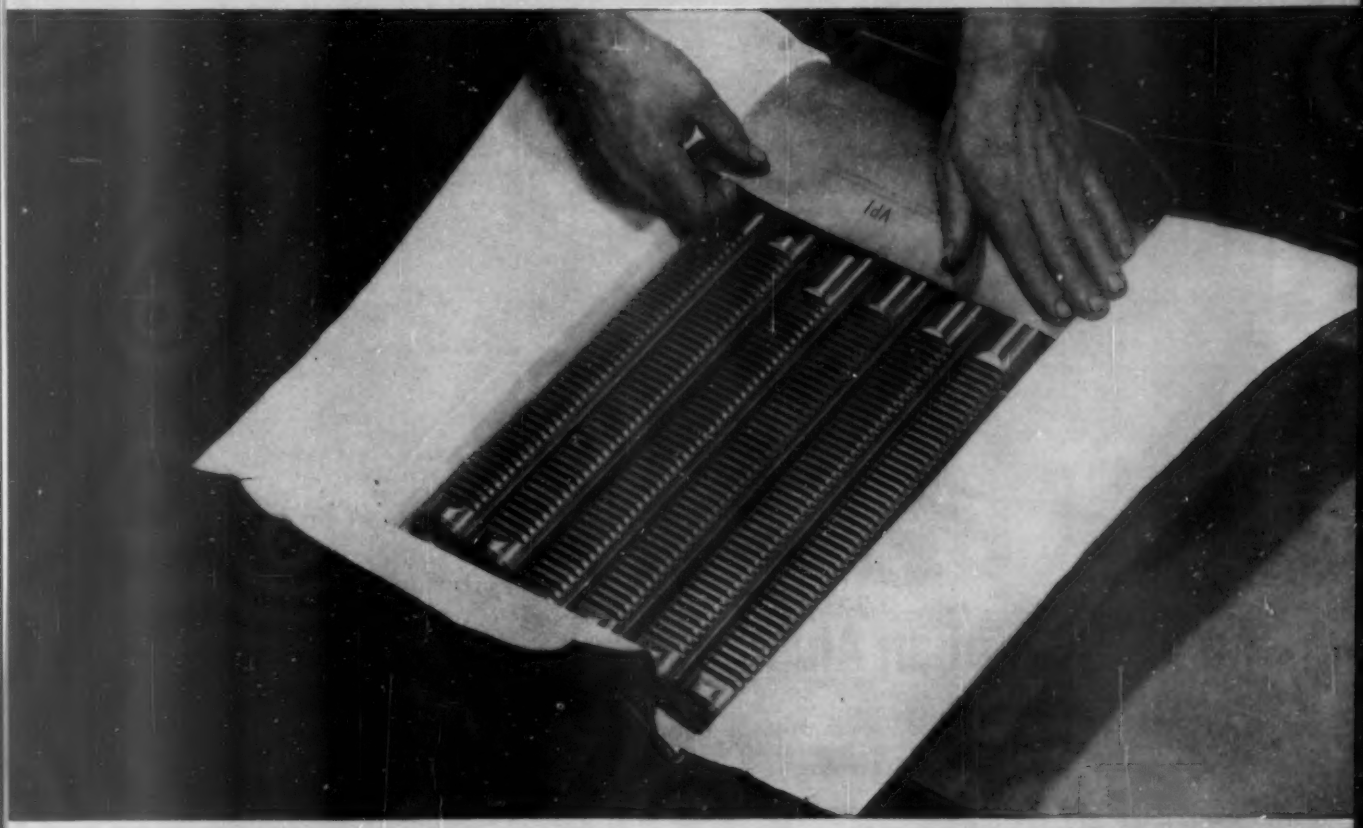
Turn the page

For more facts circle 530 on Reader Service Card

For more facts circle 531 on Reader Service Card ▶

The Ludlow Line Protects Your Products Better

8-year test proves vapor-from-paper stops rust···saves money



On January 6, 1950, a leading metals company encased a piece of mild steel in a new kind of protective packaging. It was Ludlow's VPI* Wrap — a coated paper that gives off a rust-preventive vapor. On January 15, 1958 — *eight years later* — the steel was unwrapped and examined. Here is the company's report on its condition:

"*The condition of the specimen is excellent. There is no rust or tarnish appearance and the bright, shiny finish remains.*"

And the test was conducted in a corrosive, salt water atmosphere! Because VPI *is* so effective . . . and because it costs less than messy grease or slushing oils, the VPI packaging method has gained widespread acceptance for protecting metal products during storage (see picture) and in shipment. Send for booklet.

VPI Wrap is typical of Ludlow's job-tailored packaging products. Look to Ludlow for *greater protection, lower costs and faster packaging.*

*® Vapor rust preventive — Conforms to U. S. Government's Spec. MIL P 3420

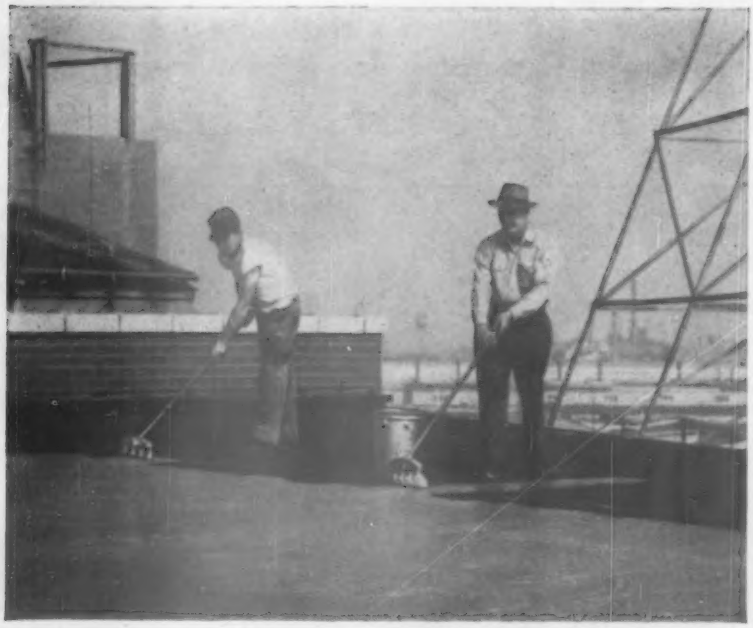
LPI

LUDLOW PAPERS, INC.

NEEDHAM HEIGHTS 94, MASS.

Sales Offices in principal cities

VPI-COATED PAPERS · GREASEPROOF PAPERS · WATERPROOF PAPERS · POLY-COATED PAPERS · GUMMED TAPES · FEDERAL SPEC. PAPERS · LABEL & SPECIALITY PAPERS · PLASTICS



CUT UPKEEP...

make any roof an Aluminum roof

Any built-up or metal roof can be given a maintenance-free, rust-proof shield of aluminum – easily. All it takes is a coat of asphalt-aluminum roof paint or coating. It will add years to a roof's life, provide metallic protection of roofing material. Your buildings will be up to 15° cooler in summer, air conditioning costs will be cut with aluminum roof coating.

When the coating is applied, tiny flakes of aluminum rise to the surface, and leaf. When it dries, your roof has a new metallic surface, firmly bonded for years. It's like putting a roof over your roof.

Give your roof new life, with asphalt-aluminum roof paint or coating, made with Reynolds Aluminum Pigment. Look for the Warranty Seal—it means at least two full pounds of pure aluminum pigment in every gallon, and an approved vehicle. If you employ a contractor be sure he's reliable and ask him to use aluminum roof paint or coating with Warranty Seal assurance.

Guard Against Rust, Corrosion with Aluminum Paint

Metals and masonry last longer, look better with less maintenance when coated with aluminum paint made with Reynolds Aluminum Pigment. Even one coat can protect against rust and corrosion. Also use it to give your plant the modern look of aluminum—inside and out.

By the makers of Reynolds Wrap

The Finest Paints Made with Aluminum are made with REYNOLDS ALUMINUM PIGMENT

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P. O. Box 2346-PJ, Richmond 18, Va.
Please send me details on
☐ Aluminum Roof Coatings ☐ Aluminum Paints
Name_____
Company_____
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City_____ Zone____ State_____

FACTORY / EQUIPMENT NEWS

Begins on page 118

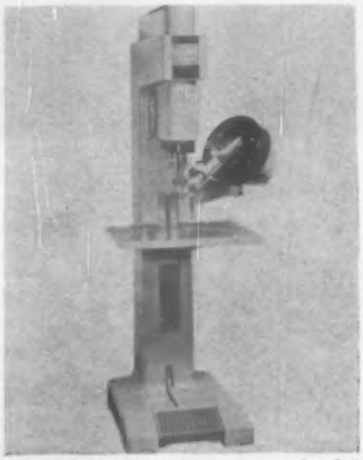
For more about these items, circle item numbers on Reader Service Card next to back cover.

147—Trolley Wheel Lubricator, air-actuated, provides lubrication to every wheel on both sides of track without stopping production line. Just open air valve and air-energized couplers engage passing trolley wheels to deliver measured amount of lubricant. Alemite Div.

148—Cut-Out Coupling offers overload protection through instant power "shut-off" action; its increased misalignment capacity provides for slight parallel and/or angular misalignment. It's easy to service; works regardless of direction of rotation. John Waldron Corp.

149—Electronic Relay for photoelectric cells amplifies the output of low-energy signals in monitoring, counting, and inspection applications. At 6 in. between scanning heads, over 2000 beam-interruptions per min. can be counted. Farmer Electric Products Co.

150—Tubeaxial Flow Fans are available for direct mounting in ducts and stacks for exhaust or supply air applications. These motorized fans come in seven sizes for ducts and stacks from 18 to 42 in. ID., in ratings from 2410 to 36,700 cfm. Westinghouse Sturtevant Div.

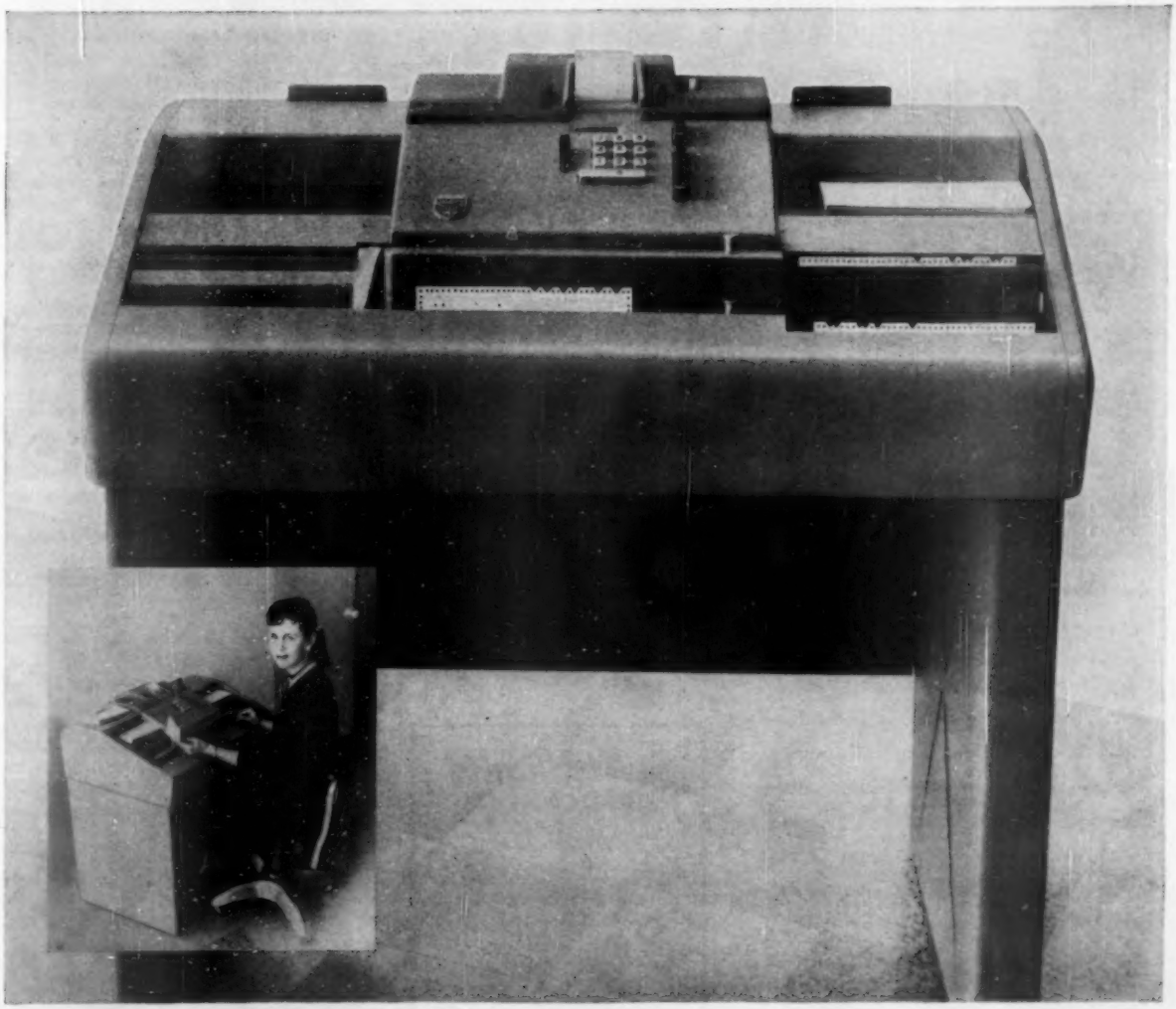


151—Power Screwdriver, magazine-fed Model U, has accuracy and flexibility for use in varied assembly operations. Has driving range from No. 6x3/16-in. to ¼ x1½-in.-long screws; clutch adjustable from 15 in.-lb. to maximum of 120 in.-lb. Detroit Power Screwdriver Co.

152—Insulation Test Set effectively evaluates insulation of large motors, generators, cable, high-voltage electronic assemblies—thus sharply reduces chance of breakdown. Portable unit weighs 80 lb. Has 4000 selenium rectifiers—no tubes. The Hewson Co., Inc.

Turn the page

Royal McBee is cutting automation down to size



NEW KEYSORT TABULATING PUNCH

Gives you automatic punched-card processing with one low-cost machine

The Keysort Tabulating Punch today cuts automation down to size by providing, in just one compact unit, everything required for complete punched-card processing. With greatest adaptability to a company's size and procedures. And at a rental of less than $100 a month.

Keysort Tabulating Punch code-punches and tabulates quantities and amounts in Keysort cards . . . then reads, duplicates and summarizes these figures . . . simultaneously printing them for visual verification. The most versatile machine of its kind available. Easy to master, easy to use. In almost every area of plant control—job costing; labor distribution; inventory; labor, material and production control; sales and order analysis. In service organizations and hospitals—in every type of operation requiring fast, accurate data processing.

Contact your nearby Royal McBee Data Processing Representative, or write us for brochure.

OUTSTANDING FEATURES ★ Simple operation from 10-key keyboard ★ Punches 2 quantities in one operation (dollars-hours, dollars-units, etc.) ★ Simultaneously tabulates all amounts ★ Reads sorted cards, automatically accumulates and totals punched amounts ★ Prints all figures for immediate verification ★ Adaptable to any size work-load . . . to centralized and decentralized operations.

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DATA PROCESSING DIVISION • PORT CHESTER, N.Y.
WORLD'S LARGEST MANUFACTURER OF TYPEWRITERS
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Diamond INDUSTRIAL TELEVISION for the TOUGH JOBS

Diamond "Utiliscope" has extremely long life

Here is a rugged and durable television system built especially for industrial use. It gives years of satisfactory service under the most difficult conditions industry has to offer . . . and with minimum attention. Diamond television systems installed as long ago as 1947 are still in operation.

Have *you* explored the possibilities of the Diamond "Utiliscope" for your remote viewing problems? It is saving money and improving operations in many plants. The coupon below will bring full information.

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Boiler Furnace Interiors
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Diamond

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SINCE 1946, DIAMOND HAS MANUFACTURED QUALITY TELEVISION FOR INDUSTRY

DIAMOND POWER SPECIALTY CORP.
ELECTRONICS DIVISION, P.O. BOX 58FF
LANCASTER, OHIO

Please send me without obligation a copy of bulletin showing how Diamond Industrial Television will help me reduce costs and improve operations.

Name_____

Title_____

Company_____

Address_____

FACTORY / EQUIPMENT NEWS

Begins on page 118

For more about these items, circle item numbers on Reader Service Card next to back cover.

153—PyroProbe, 40-oz, metal-surface thermometer, gives quick, stable temperature measurements on metal surfaces such as motors. It's done by incorporating material of the surface to be measured into the instrument's thermocouple circuit. Royco Instruments, Inc.

154—Machine Tool Motors in ratings from ½ to 10 hp. are totally enclosed fan-cooled and totally enclosed non-ventilated types, for continuous or intermittent duty. Fin type design and cast aluminum alloy frame provide efficient heat dissipation. Reuland Electric Co.

155—Electronic Air Cleaners with fully automatic operation are available in sizes to handle requirements from 1920 to 28,800 cfm. Washing and adhesive application on these packaged-type (Model PG) air cleaners is completely automatic. Westinghouse Sturtevant Div.

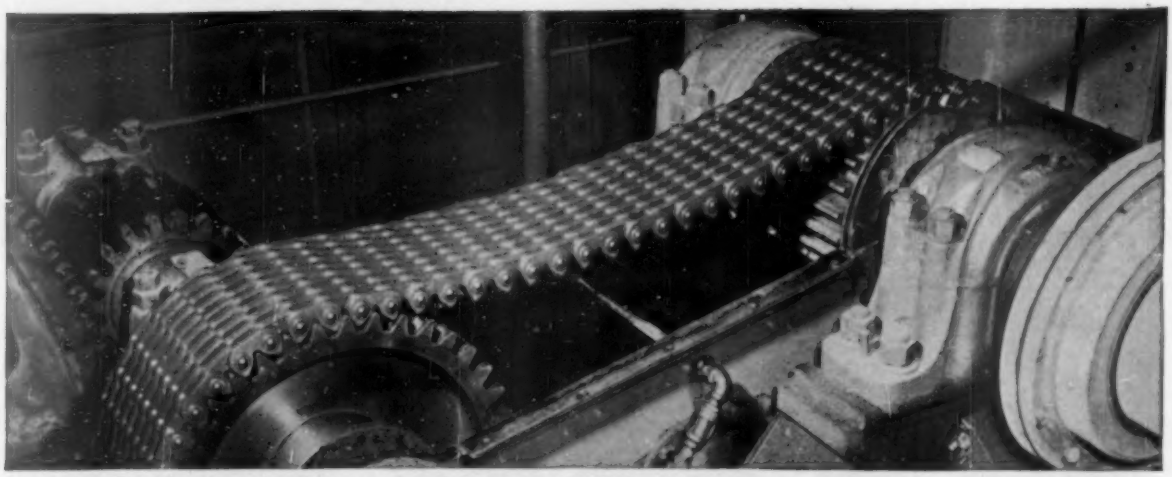
156—Portable Outdoor Vacuum is a wheel-mounted cleaner, for use inside or outside factory areas. Compact, gasoline-powered unit may be used with re-usable or disposable bags to pick up waste paper, leaves, and other light trash. Michigan Production Engineering.

157—Hose and Cable Bridge finds wide use on new and in-plant construction jobs where electric cables, water or air hoses must be traversed by heavy wheel traffic. Produced as a steel casting, the device weighs about 32 lb. per unit. Calumet Steel Castings Corp.

158—Railroad Car Shunter is a single-wheel, single-cylinder device for shunting railroad cars in and out of plant sidings. Operated by one man, it can move any car weighing up to 100 tons, at normal walking speeds. Unit weighs 550 lb. Car Shunter Co. of America.

159—Man-Made Diamond Wheels are reported to increase grinding efficiency up to 35%—especially when resinoid bonded wheels are used for grinding hard cemented carbide tools. Resinoid and vitrified bonded wheels are offered in all sizes. Simonds Abrasive Co.

Turn to page 146



HIGH SPEED. Traveling at speeds as high as 5000 fpm, silent chain drives readily accommodate the extreme peak loads without losing their better-than-98% efficiency.

How LINK-BELT silent chain drives survive industry's roughest requirements

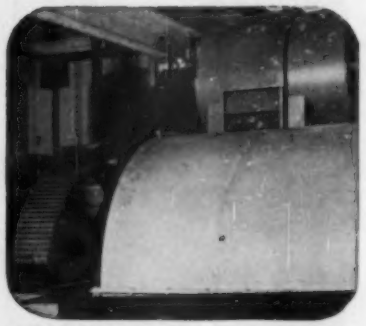
Would your drives do as well?

On applications like these and scores more, no other type of drive is the equal of Link-Belt silent chain. Ask your Link-Belt office or authorized stock-carrying distributor for comprehensive 88-page Book 2425.

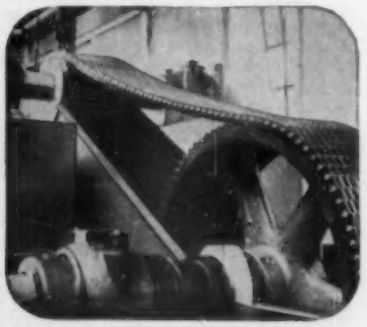
LINK-BELT

SILVERSTREAK SILENT CHAIN DRIVES

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,079

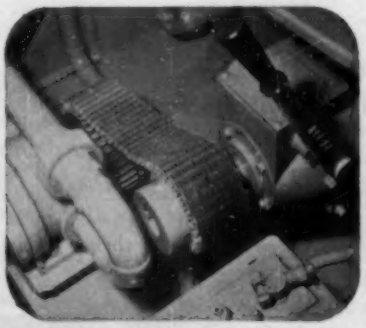


LARGE OR SMALL HP. On a 300 hp drive like this or at fractional hp, silent chain is always lower in ultimate cost.

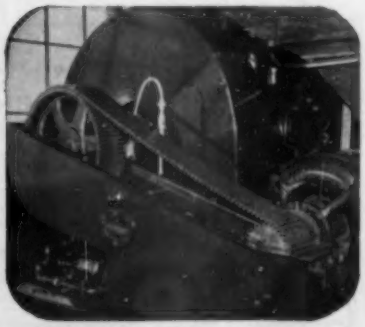


LARGE RATIOS. Link-Belt silent chain operates efficiently on extremely short centers at ratios as high as 10-to-1.

ADVERSE OPERATING CONDITIONS. Heat, humidity and cold have little effect on Link-Belt silent chain drive performance.



LIMITED SPACE. Easy to assemble in close quarters, Link-Belt silent chain permits built-in drives, compact housings.



LONG LIFE. This drive is 16 years old and still going strong. Not unusual—many others have lasted twice that long.

Your old, used floor machine or vac is worth big money if you...

TRADE-IT-NOW

FOR A NEW ADVANCE!

For a short time only, most Advance distributors will offer you big allowances on your old floor machines and vacs when you trade them for new Advance floor and rug maintenance equipment. Now, you can "retire" that worn-out, too-small machine, and get a new, high-speed Advance unit in a size and price that fits your needs. Chances are, the generous allowance you'll receive, plus the labor costs you'll save, will pay for your new machine in a few months. You'll be surprised at what your old machine is worth if you TRADE-IT-*NOW* for a new Advance. Phone your distributor or mail the coupon below. Do it today! No obligation, of course.

ONLY ADVANCE GIVES YOU...

- Your choice of 15 different models of floor and rug maintenance machines—ranging in size from 12" to 24"—priced as low as $159.00.
- Your choice of 11 different models of "Hydro-Jet" wet-dry industrial vacuum cleaners—with capacities from 5 to 55 gallons.
- The all-new "Convertamatic" combination scrubber-polisher-vacuum for big floor areas. Use it for high-speed polishing and dry vacuuming, or for scrubbing and wet pick-up. Entire floor maintenance job is done completely in one quick pass. Cleans 12,500 square feet per hour—up to 20 times faster than possible with ordinary methods!

ADVANCE FLOOR MACHINE COMPANY

ADVANCE MACHINE COMPANY, 4102 AB Washington Ave. No. Minneapolis 12, Minnesota

I'm interested in "retiring" my old machine(s). At no obligation,

☐ Please send me literature on Advance floor machines and vacs.

☐ Please have your distributor call to give me an allowance figure on my present equipment.

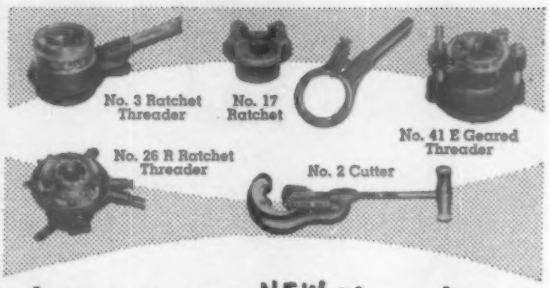
Name.....

Firm.....

Address.....

City.....

For more facts circle 536 on Reader Service Card



be sure your NEW Threaders and Cutters are really new... buy BEAVER!

No. 3 RATCHET THREADER—Enclosed teeth for greater safety, threads ⅛" to 1" pipe—¼" to 1" bolts. Can't clog. Dies easily removed to resharpen. — **No. 17 RATCHET**—Lightweight! Threads ⅛" to 2". Ribs in bore of head assure perfect centering and accurate threads. — **No. 41 E GEARED THREADER**—One set of dies for 2½" to 4". Threads pipe and conduit with same dies—10, 11½ and 14 thread pitch—¾" or ¾" taper. — **No. 26 R RATCHET THREADER**—Threads 1" to 2" without changing dies or bushings. Cut standard, over- or undersize threads of uniform length. — **No. 2 CUTTER**—Pressure applied directly to wheel. Cuts ⅛" to 2". Has new Beaver Black Magic Cutter Wheels for both heavy and light work.

BEAVER PIPE TOOLS INC. 299-500 DANA AVE. WARREN, OHIO

Can't Tell It All Here! Write for latest facts on all-new Beaver Machines.

Have a Cutting or Threading Problem? Let Our Engineering Research Department help you solve it.

For more facts circle 537 on Reader Service Card

GET THIS FREE GROUTING GUIDE

... before you Grout another piece of heavy equipment

Send for this *free* grouting guide which clearly illustrates 11 common machinery settings, methods of grouting and forming, and hot and cold weather grouting. Discussion covers proper mixing and placing of grout, reasons for using prepared, non-shrink grout, etc.

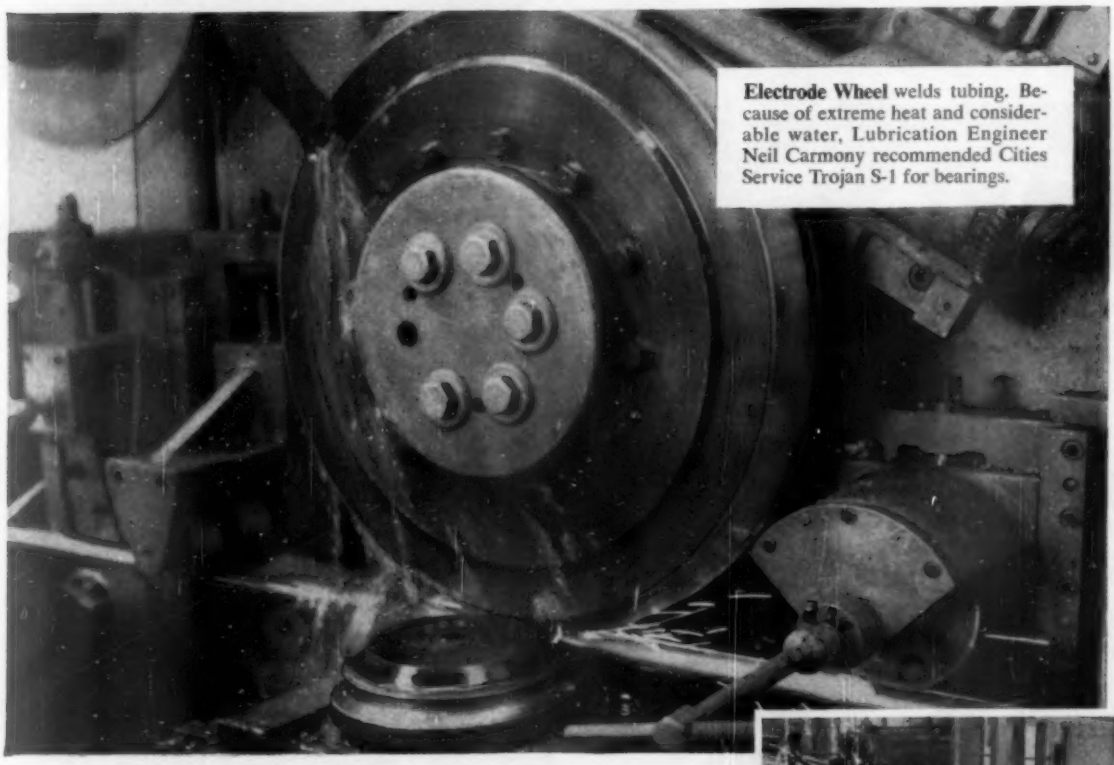
DIVISION OF AMERICAN-MARIETTA COMPANY

the MASTER BUILDERS co.

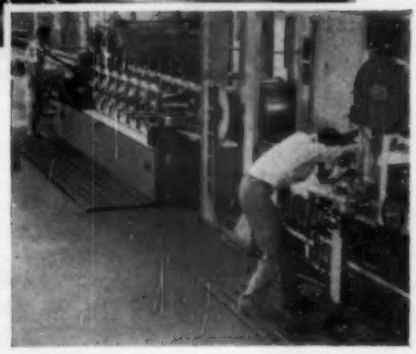
CLEVELAND 3, OHIO TORONTO 9, ONTARIO

For more facts circle 538 on Reader Service Card

New Tubing Mill Produces at Speed of 350 Feet Per Minute!



Electrode Wheel welds tubing. Because of extreme heat and considerable water, Lubrication Engineer Neil Carmony recommended Cities Service Trojan S-1 for bearings.



It's Cities Service for Hydraulic System and all lubrication

On January 1, 1957, P&H Tube Corporation put a new mill in production at Bossier City, Louisiana—the only one of its kind in the United States.

Equipped with special drives and worm gears, this unique mill actually produces at the rate of 350 feet per minute—twice the speed of conventional tubing mills!

With speeds like this, you might expect lubrication troubles . . . but P&H Tube Corporation has none. One big reason is the careful study of each machine made by Cities Service Lubrication Engineer Neil Carmony—and the lubrication recommendations he made.

In hydraulic units, for example, Carmony recommended Pacemaker 200-T Hydraulic Oil . . . for he knew its ability to withstand the severest operating temperatures and speeds. He knew that due to its exceptionally high viscosity index and superior compounding, Pacemaker 200-T would give maximum resistance to thinning, oxidation, rust and corrosion.

The wisdom of this decision, as well as the choice of other lubricants shown in the chart at right, was demonstrated recently when P&H Tube Corporation ran off 125,000 feet of tubing in an ordinary eight hour shift—with normal time-out for change-overs!

That's production with a capital P! And if you'd like to improve your production picture, a Cities Service Lubrication Engineer can help you, too. Call the nearest office or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

What the Cities Service Lubrication Engineer Recommended

Hydraulic units	Pacemaker 200-T
Bearings	Trojan H-2 Grease
Drive units	Pacemaker Oils
Bearings by the mill's electrodes	Trojan S-1

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

FACTORY
MANAGEMENT AND MAINTENANCE

HUMAN RELATIONS

By GEORGE A. HOY, JR., Industrial Management Editor, FACTORY

Latest Test for Managers

"In-basket" is the name given the new paper hurdle prospective managers may one day have to leap before entering the executive suite. It's being developed by the Educational Testing Service, Princeton, N.J., as part of an eight-company, 10-year study (not yet completed) of what executives do.

Here's how the test works: Executives are given an "in-basket" of specially prepared memos, reports, letters, and other communications. They write out their decisions, return the communications. These are scored—not as right or wrong, but in terms of the management traits their reactions suggest.

Here are some of the qualities the test reveals:

- Ability to think constructively.
- Analytical ability.
- Cooperation with others; tact.
- Aggressiveness and drive.
- Originality.
- Independence of thought.
- Self-expression.

It's interesting that executives who have taken the test themselves seem to get personally involved, lose themselves in the work, start signing their own names to their replies.

Biggest problem in developing the test for general use is scoring. Businessmen asked to rate responses have come up with as many evaluations as there are answers. (Stands to reason, doesn't it?)

Morals: (1) You can learn a lot about your supervisors by observing how they handle their mail. (2) If some day you find an odd batch of mail in your "in-basket," you may be headed for mahogany row.

Supervisors Miss the Point

Maybe you missed the recent Newsweek article that carried the results of a little survey—repeated in the table that follows here. Even if you did see the article, the results are worth reviewing. They compare the way workers themselves rate their job features with the way foremen think their workers feel about their job features:

Job Features	Employee Rating	Foreman Rating
Appreciation for good work	1st	8th
Feeling "in" on things	2nd	10th
Help with personal problems	3rd	9th
Job security	4th	2nd
Good wages	5th	1st
Work that keeps you interested	6th	5th
Possibilities for promotion	7th	3rd
Personal loyalty to the workers	8th	6th
Good working conditions	9th	4th
Tactful discipline	10th	7th

Try the same survey with your supervisors. If they miss the point as these foremen did, your training department needs adrenalin.

Marvelous Problems Coming

Coming technical marvels will bring bigger-than-ever problems of finding people qualified to operate equipment, says Ralph G. Smith, Dow Chemical Company. And your best gage of future effectiveness in meeting this problem is your performance today.

Management is shortsighted if it eliminates on- and off-the-job training in order to cut plant costs. "If we don't keep our men trained to handle the technical equipment of today, we're sunk . . . in our efforts . . . to handle . . . marvels that are coming," says Smith. Other advice:

- Analyze your own needs in building a training program. Don't follow someone else's program.
- Adhere to rigid standards. Weed out those who are not benefiting from training.
- Make training costs available. Don't bury them.
- Query operating managers about the results of training in their areas. They may see better morale, fewer grievances, reduced turnover, better production, lower costs.

Emotional Mirror for You

Here's a mirror any manager can use to check the state of his emotions. It was polished by William C. Menninger, M.D., famous psychiatrist. He makes the point that most executives have periodic physical health check-ups, and that they also could benefit from periodic mental health check-ups.

Here are some of the searching questions Dr. Menninger would look into in making an emotional check-up of an executive.

1. How consistently is he able to "get along" with his associates? Which ones does he like or not like, and why? Is he a prima donna? All of us have bad days, but how frequently do his occur?

2. Is he so immature that he has to have what he wants when he wants it? And if he doesn't get it does he pick up his marbles and leave the game? Or is he mature enough to have learned that most of the things he wants he has to work and wait for.

3. How much satisfaction does he find in constructive, creative giving of himself? Normal emotional development requires progression from the childish interest in receiving to the mature interest in giving.

4. Does he seek and accept help when he needs it? The manager, like everyone else, should have a good listener to turn to at times. Someone whom he respects and who will keep his confidence. This listener may be his wife, someone in the organization, a good friend, his physician, a clergyman, or, in time of emotional trouble, perhaps a psychiatrist.

How did you do in this mirror? If you were low on the first 3 looks, try applying No. 4.

Quick, Out of That Rut!

"We are living in a time of change. Our products are changing—our research techniques are changing—our methods of manufacture are changing. The jobs of the engineer are changing, too. Over a period of a few years a lot of engineering jobs may even cease to exist in anything like their present forms.

"We can't afford to assume that professional specialization alone will be adequate in a world that demands increasing flexibility and versatility."

Whose words? Chrysler Corporation Vice President James C. Zeder.

What meaning? Operating managers of the future will need to expand their interests in economic, political, and social problems.

Human Relations Defined

Human relations is not smiling and backslapping. Neither is it control or manipulation. It is realistic, practical—compatible with the aims of business.

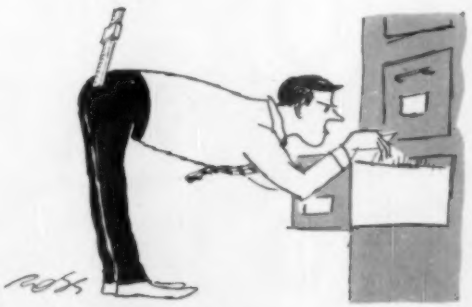
"The objective of good human relations is not to create one big happy family. Its objective is simply to provide an environment for the pursuit of happiness. Some employees will pursue it and find it. Others may do neither."

Whose definition? Professor Keith Davis's (University of Indiana), speaking before the New York Metropolitan Chapter of the American Society of Training Directors.

Salaries Up, Bonuses Down

Average salary of middle managers is now $11,800, says American Management Association. Figure comes from a survey of 8100 executives in 286 companies. Increase is 4.8% over last year's, but rate of gain is down from 1957's 5.8% rise over '56.

Bonus payments were down, with only 37% of managers receiving them, compared with 45% in '57. Manufacturing managers fared better than did financial, purchasing, and industrial relations men.



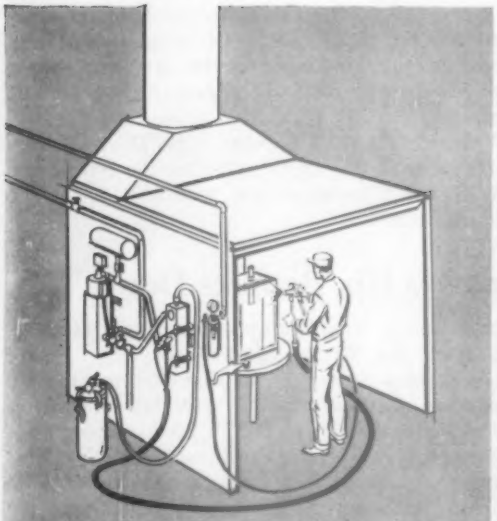
Faded Promises

"My first job wasn't what the recruiter said it would be," said 20% of 1300 surveyed engineers—as reported by J. D. Staley of American Management Association to the American Society of Mechanical Engineers. The complaining engineers found themselves with checking, graphing, and filing jobs that "their Aunt Minnie could do." The experienced, senior scientists they were to work with were nowhere in sight. And the lavish personal touch of the recruiting effort gave way to an impersonal work atmosphere.

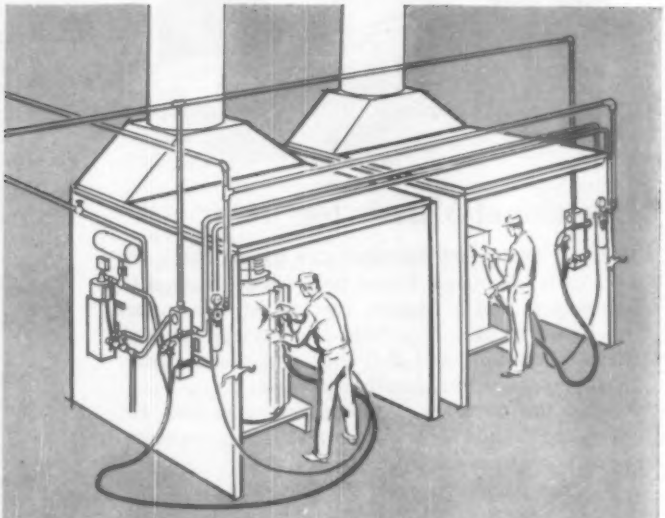
Engineers, like any other employees, resent being assigned jobs that are considerably beneath their ability. It's a symptom of poor recognition.

If it's your policy to hire young professionals to do routine work while they learn about the organization, that's your business. (I think it's a good way to screen out any good potential managerial material early in the game.) But don't mislead the professional during the recruiting process. He resents being misled even if he stays with you.

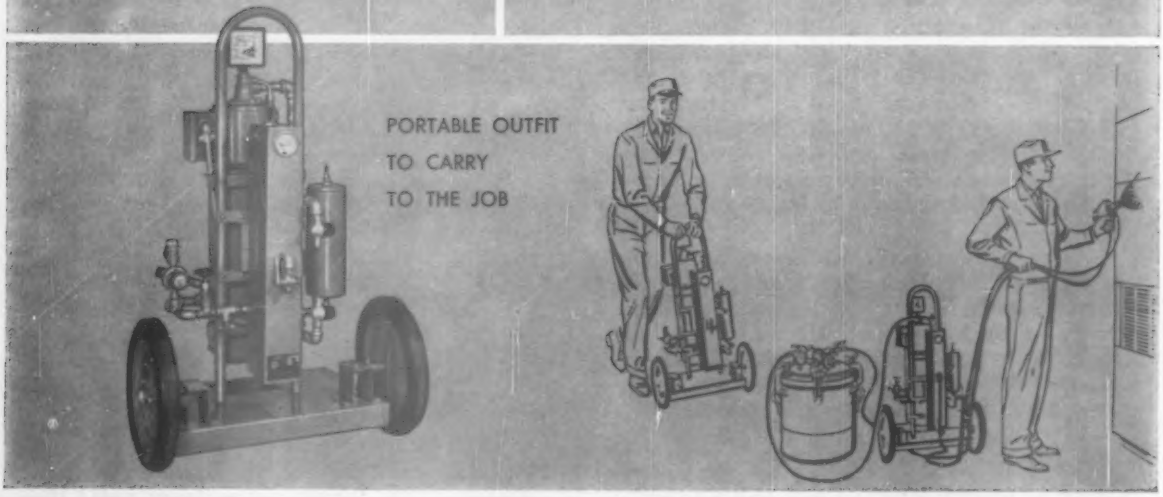
How DeVilbiss Hot



STANDARD OUTFIT . . .



ADAPTABLE TO MANY REQUIREMENTS



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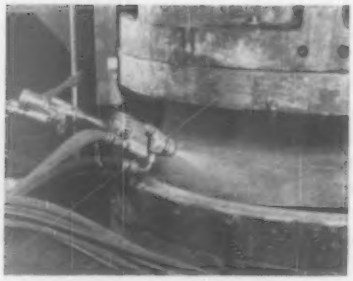
TO CARRY
TO THE JOB

DeVilbiss Automatic Spray Machines coat products of any size or shape quickly, economically, automatically.
Send for Series I-8000 Bulletins



DeVilbiss Automatic Guns spray drawing compound for accurate die lubrication; adapt to automated plants.
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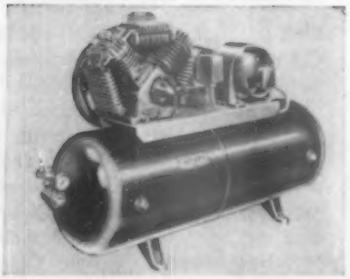

DeVilbiss Air Compressors deliver as much as 22.6% more air per power dollar. Sizes range from ½ to 15 hp.
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Spray cuts painting costs

Heavier film builds • Less overspray
Faster drying • Easier application • Fewer rejects
Better flow-out for high gloss

Using a DeVilbiss Paint Heater, you can get better coverage with *one* coat than you generally get with *two or more* cold-sprayed coats!

Here's why: Heat acts as a thinner to permit easier atomization and brings about new efficiency in spray painting. Even with your regular paint, heavier finishes can be applied with a savings of up to 50% in materials.

What's more, thinners are vaporized faster, drying time is decreased, finishes flow smoother and with less shrinkage. And the lower spraying pressure greatly reduces wasteful overspray.

Whatever model paint heater best suits your requirements—a standard or portable outfit, or one adapted to your paint shop layout—you enjoy a big advantage by buying from DeVilbiss, the only one-source designer and manufacturer of complete, engineered finishing systems or individual components in the industrial-coating field.

For it's this one-source responsibility that means important savings to *you* in the initial purchase; in the assurance of high product quality; and in the efficient performance of each individual component.

Call your nearest DeVilbiss branch today, or write for free booklet, "New Efficiency from Hot Spray."

THE DEVILBISS COMPANY, Toledo 1, Ohio • Barrie, Ontario • London, England • Branch Offices in Principal Cities

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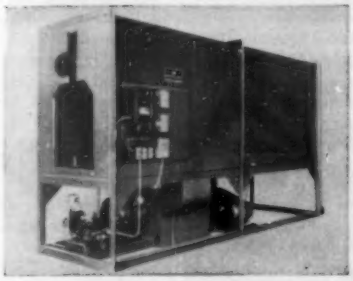
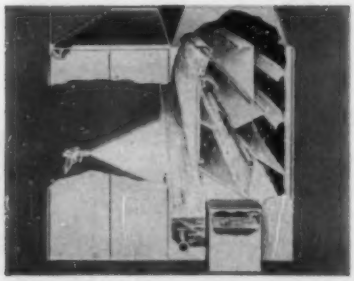


DeVilbiss Ovens are designed and manufactured to meet layout and process needs for baking or drying.
Send for Oven Catalog



DeVilbiss Spray Booths. Over 700 standard models provide efficient paint trapping for each individual job.
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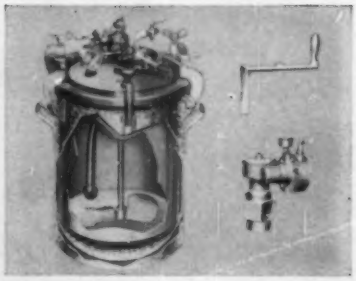

DeVilbiss Paint Tanks. Hand or motor-driven agitation for heavy materials. Galvanized. Simple! Foolproof!
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ANCHOR FENCE
Division of ANCHOR POST PRODUCTS, INC.®

your answer to 4 basic plant problems

Anchor has built its fence with exclusive features to give you more of the positive protection you need. Special terminal posts remove all potential toe and hand holds. Anchor's exclusive deep-driven anchors combine with H-Beam line posts to give you a fence of unmatched strength and rigidity. Gates are one-piece welded construction, designed to stay rattle and sag proof. And Anchor chain link fabric is galvanized *after* weaving for extra-long, corrosion-resistant life.

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Sold direct from branches and warehouses in all principal cities.

FACTORY / EQUIPMENT NEWS

Begins on page 118

For more about these items, circle item numbers on Reader Service Card next to back cover.

160—Pipe Cutter, easily used by one man, quickly cuts heavy soil pipe or tile. Operator wraps chain around pipe, pulls handle, and cleanly cuts 2- to 4-in. pipe or tile. By adding an extra chain he can cut 6-in. soil pipe or 15-in. tile. Wheeler Mfg. Co.

161—Widetread Extension Ladder of magnesium provides 2½-in.-wide steps for standing workers—with reeded step-rungs for non-skid footing. Lightweight ladders, equipped with rope and pulley, are available up to 40 ft. long. White Metal Rolling & Stamping Corp.

162—Spraymist Coolant Unit, compact and self-contained, becomes an integral part of production machines. Unit includes air filter, trap, regulator and gage, solenoid valve and conduit box, 18-oz. or 1-gal. pressurized coolant reservoir. Bijur Lubricating Corp.

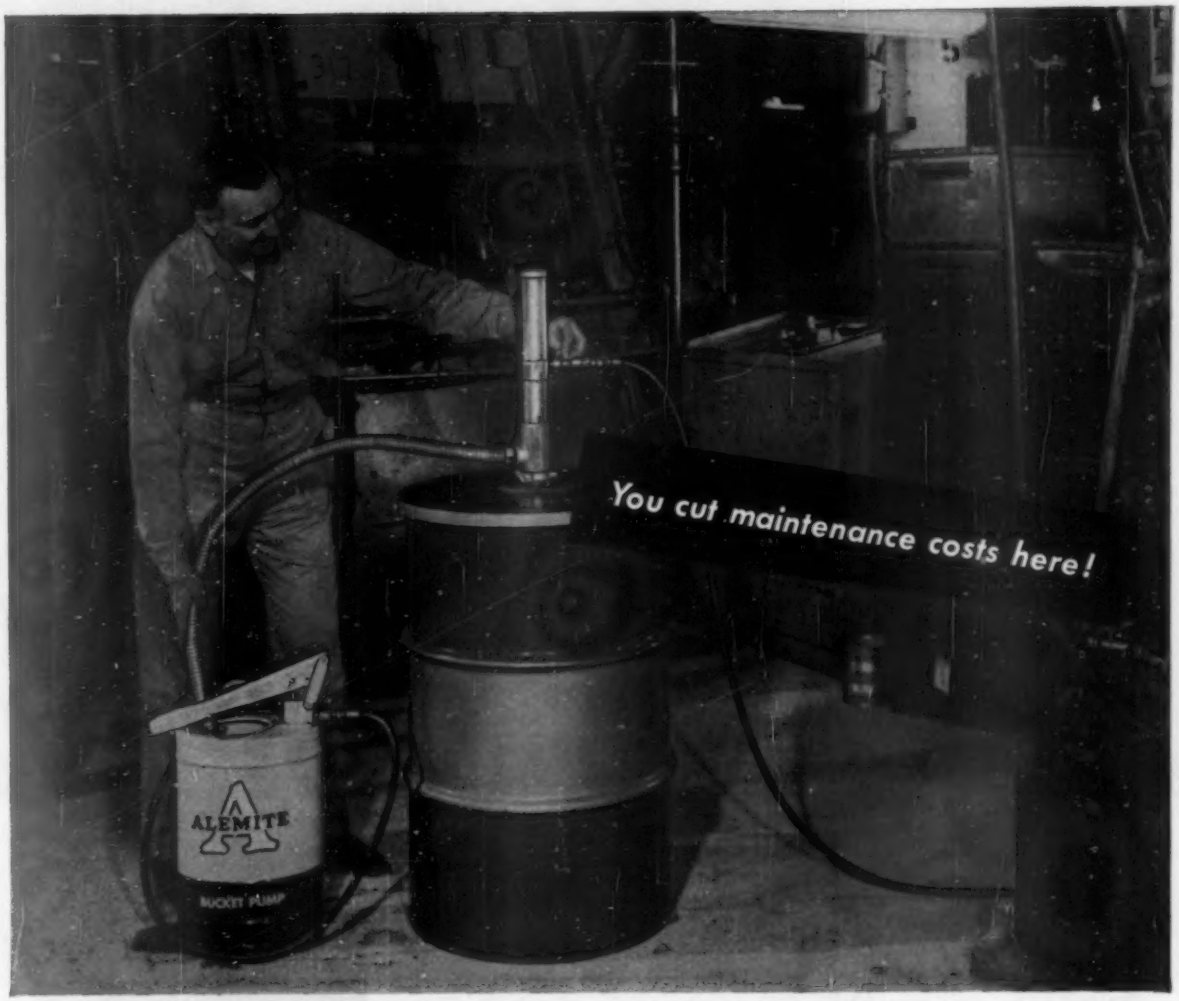
163—Steel/Concrete Fastening Tool, powder-actuated "77", drives full range of ¼- and ⅜-in. drivepins with single caliber catridge. Interchangeable barrel-guard design quickly adapts light tool for electrical, lathing, and door-buck work. Omark Industries.

164—Streamlined Trolley and Wheel combination, for use with maker's "Bush-Lock" overhead cable conveyor, is well suited to operations like food processing where easy clean-up is required. Trolley is rustproof; wheel has sealed lubrication feature. E. W. Buschman Co.

165—Erecto Aluminum Booster is suitable for stacking and unstacking in storage areas, and for loading and unloading vehicles. Standard 10-ft. length may be expanded by slider bed to 15 ft.; reversible motor furnishes power for either direction. Lamson Corp.

166—Warehouse Racking System is quickly assembled to your specs from building block components, pre-cut to size. It can handle pallets or skids to any breadth or height, permits expansion in any direction, and supports loads up to 5000 lb./pallet. Borg-Warner Corp.

Turn the page



Alemite Power Transfer of Lubricants Is 63% Faster Than Hand Method!

Wherever old-fashioned hand methods are used to transfer lubricants from original drums to other containers, time and money are wasted!

This high-speed, air-powered Alemite Transfer Pump transfers 37 pounds of pressure gun grease per minute, direct from original drum to loader pump, bucket pump or power gun. This gives you 63% faster transfer than by hand! And lubricant is always sealed—fully protected against mess, waste and contamination.

Pump also handles alcohol, cutting oils, kerosene—almost any non-corrosive, non-abrasive fluid used by the drum. Synthetic rubber air piston requires no oiling. Fully adjustable delivery rate . . . weighs only 15½ pounds!

Step up to fast-moving, time-saving transfer of fluid and semi-solid materials. Check Alemite's complete line of lubrication equipment for industry.

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SCREWDRIVING TOOLS

lower costs

The cost of a screwdriving tool isn't measured by the price of that tool, but by the amount of work it will do for you.

The cost of an Apex insert bit*, for example, is invariably less than the cost of an ordinary insert bit, simply because an Apex bit will drive so many more screws. Apex insert bits are precision-built of special shock-resistant steel, heat-treated and tempered to the proper combination of hardness and toughness for your specific screwdriving job.

Right now, when every phase of production is being carefully checked for possible economies, it's just good business to look beyond mere price—to actual tool costs. You can start by writing, on your company letterhead, please, for the new Apex Screwdriving Tools Catalog.

* Apex originated and pioneered the development of the insert bit and bit holder combination, a major advancement in screwdriving techniques.

1933 *A Quarter Century of Service to Industry* 1958

THE APEX MACHINE & TOOL CO.
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Dayton 1, Ohio

TOOLS FOR screwdriving nut running FASTENING

FACTORY / EQUIPMENT NEWS

Begins on page 118

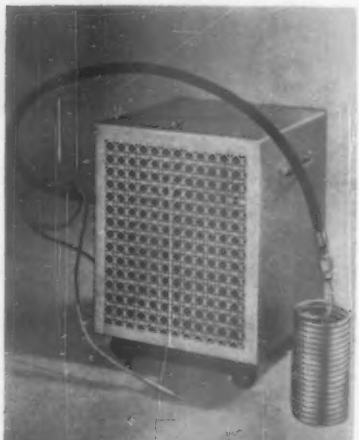
For more about these items, circle item numbers on Reader Service Card next to back cover.

167—Visularm Condulets provide at-a-glance warning of dangerous operating conditions in manufacturing processes. A light, horn, siren, or bell signal can be used to indicate abnormal temperature, pressure, liquid level, speed, load, or other condition. Crouse-Hinds Co.

168—Area-Type Flowmeter accurately measures flow rates with new standards of float stability. The float lines out quickly to permit exact reading of flow value without visual averaging. A quick-out flow tube permits easy maintenance and range change. C-Mar Corp.

169—Ratchet Knockout Punch Driver quickly punches holes through 10-gage metal for ½- to 3-in. conduit—takes just one revolution of handy ratchet handle to punch through. Sturdy metal carrying case stores the 6½-lb. driver and accessories. Greenlee Tool Co.

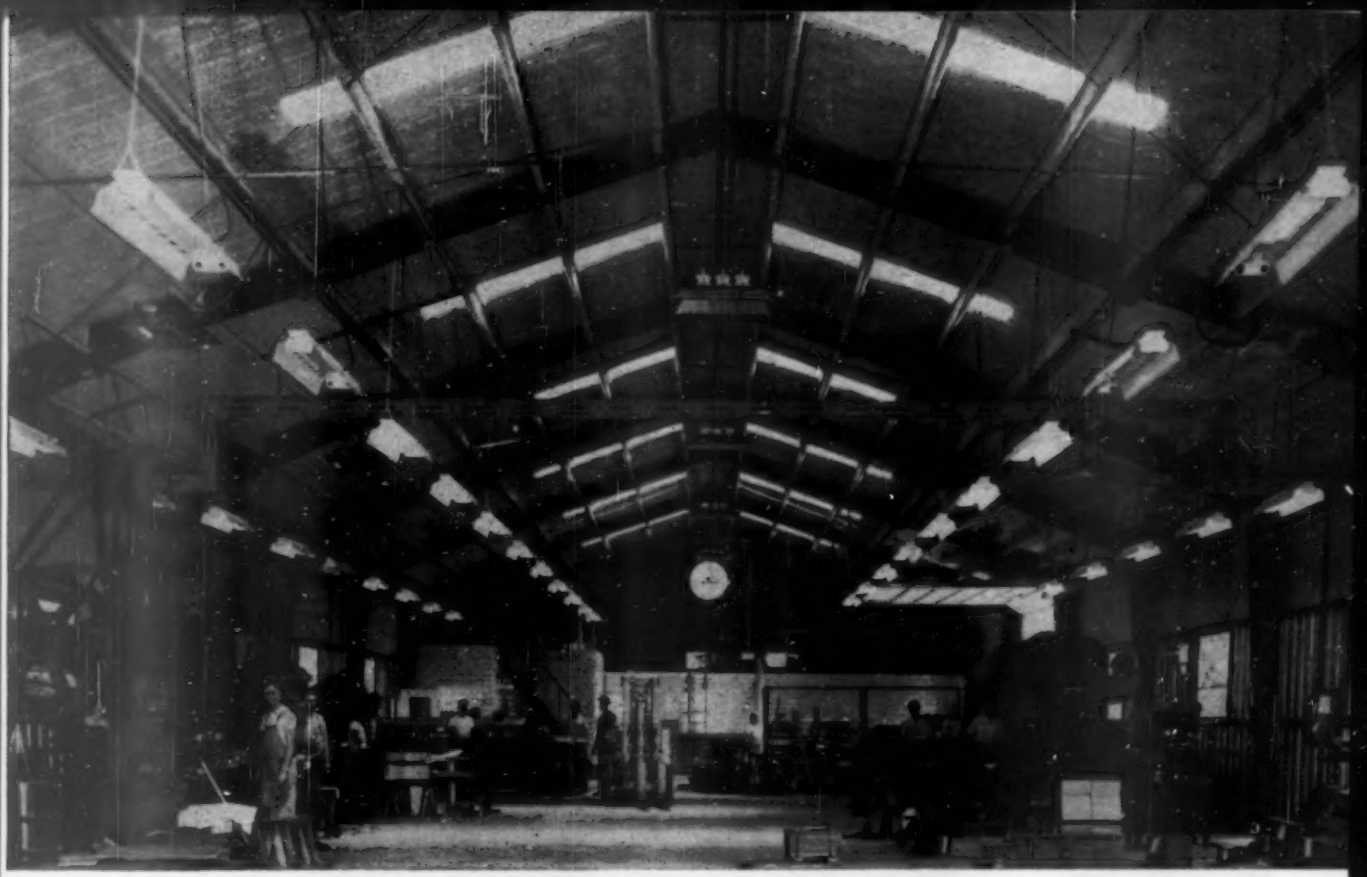
170—Wirebound Pallet Boxes are low-cost, re-usable units for both shipping and bin storage. Sturdy construction permits stacking them to the ceiling; four-way entry facilitates lift truck handling. Four sizes available; load capacity is 1½ tons. General Box Co.



171—Cold Coil carries cold to the job. Self-contained, portable device plugs in any 115-v. a-c outlet and provides a refrigerated cooling coil which can be immersed in liquid or placed in a cabinet to create a cold chamber, as needed. Andrew Technical Supply Co.

172—Optical Comparator offers 80 sq. in. of measuring area for accurate inspection of extra-large, heavy parts. Up to 10 in. of lateral measurement is provided, and vertical measurement up to 8 in., with the rugged, roller-mounted table. Jones & Lamson Machine Co.

Turn the page



Need more plant space?

This factory-built steel building houses a production unit, several administrative offices, an engineering and drafting room, an employee recreation room, and washroom facilities. And it was built in only 800 man-hours!

You can't beat this kind of construction for a quick, cost-saving way to expand plant space. It saves time and labor because the structural steel framework and USS Galvanized Steel Sheets are pre-cut to standard sizes and ready to bolt together. No special tools and no skilled labor are needed. And when you move into a steel building, every inch of space is usable because the rigid steel framework and clear-span construction leave the whole floor area free for your use.

United States Steel produces USS Galvanized Steel Sheets, Structural and High Strength Steels which are used by the manufacturers of these buildings. We will be glad to see that you receive complete, free information about the kind of steel building you need.

United States Steel

USS TRADEMARK

United States Steel Corporation
Room 2831, 525 William Penn Place
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I'd like to have more information about factory-built steel buildings for the following uses: _____

_____

_____

Send information to:

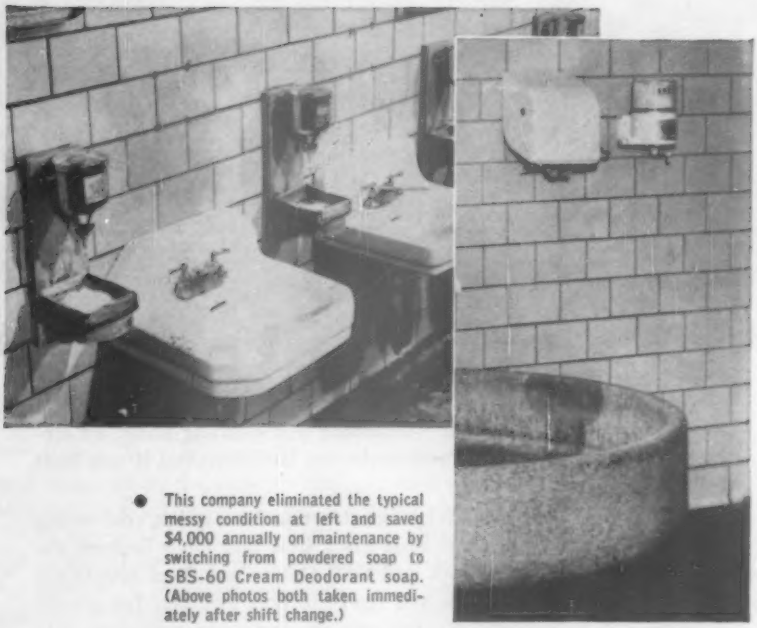
Name .....

Street .....

City ..... **State** .....

(Your request for information will be forwarded to the manufacturers of these buildings and you will hear directly from them. There's no obligation on your part.)

If you're serious about economizing, start here



● This company eliminated the typical messy condition at left and saved $4,000 annually on maintenance by switching from powdered soap to SBS-60 Cream Deodorant soap. (Above photos both taken immediately after shift change.)

Waste soap is not the only needless expense in washrooms. Waste *maintenance* is even more costly. The company in the picture at right above saved some $4,000 a year in maintenance men's time by switching to SBS-60, the cream-type cleanser. How did SBS-60 accomplish this? Easy! One SBS-60 dispenser replaces six or more conventional powdered-soap dispensers. And the SBS-60 dispenser need be filled as little as once every three days, opposed to as often as three times daily for powders. In addition to all this maintenance time saved, of course, there is the tremendous saving in soap itself, for SBS-60 is almost impossible to waste. If you really want to cut costs, start by investigating this new concept in cleansing economy: SBS-60 Cream Deodorant soap! Write for details to dept. 58-I 1.

the washword of industry

SBS sugar beet products co.

SAGINAW, MICH. • Los Angeles, Calif. • Newark, N. J.
CANADA: Chemical By-Products, Ltd., Rexdale, Ontario

FACTORY / EQUIPMENT NEWS

Begins on page 118

For more about these items, circle item numbers on Reader Service Card next to back cover.

173—Twin-Light Loading Lamp throws more light on the job. Design, with two lights on one handle, gives double the light volume at freight handling points and wherever temporary volume illumination is required—to inspect boilers, tanks, etc. Daniel Woodhead Co.

174—Heavy-Duty Storage Racks with double-bay load capacities to 10 tons are quickly constructed using new Beam-Strut clamps. Clamps permit use of standard channel or I-beam for load-bearing stringers and ordinary pipe for uprights, cross pieces. Tube-Strut Corp.

175—Open-Type Motor Stators cast in epoxy resin assure complete protection for the insulation system, says maker—who will offer encapsulated systems for use in severe atmospheres, in all integral hp. frame sizes using random-wound coils. Allis-Chalmers Mfg. Co.

176—Self-Regulating Transformer (distribution type—oil filled) automatically offsets voltage drop under varying loads in 2½% steps to ±10%. Primary ratings are 2400 to 14,400 volts; secondary, 120 or 240 volts. Kva. ratings are 10 to 100. McGraw-Edison Co.

177—Janitorial Cart permits sweeping refuse directly into cart by broom—no shoveling necessary. Free-wheeling cart is easy to maneuver around machinery. Angle iron shafts, welded to 18x18x18-in. flared steel body, have smooth pipe push bar. Screw Conveyor Corp.

178—Resin Dispenser for liquid resin and hardener systems is calibrated to meter both in exact proportions, through drip-proof valves. Hand- or motor-driven unit will function satisfactorily for most two-component adhesive and coating systems. Delsen Corp.

179—Tong Test Ammeters, available in eight types, measure both a-c and d-c up to 1000 amp. You just press trigger and snap tongs around an electrical conductor without breaking circuit or insulation—readings are instantly obtained. Columbia Electrical Mfg. Co.

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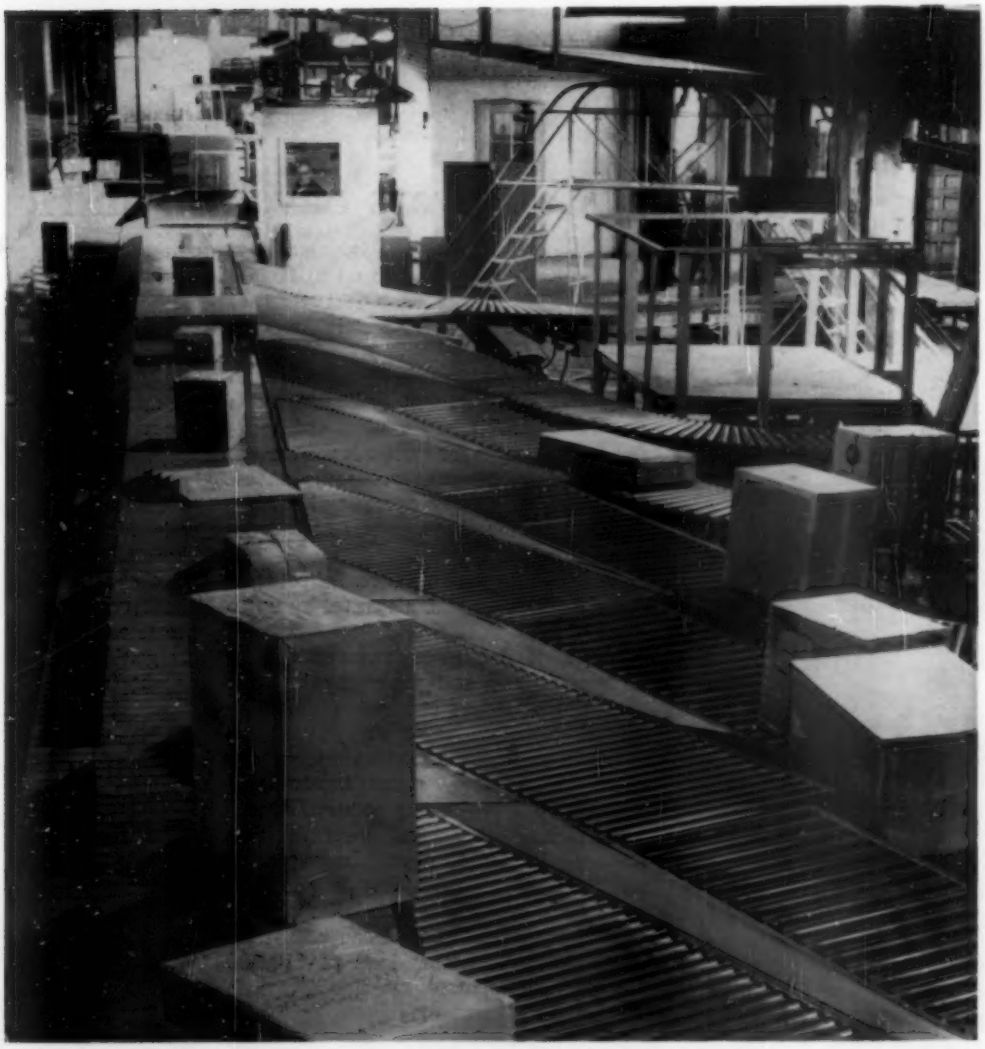
FACTORY
MANAGEMENT AND MAINTENANCE

PLANT OPERATING MANAGEMENT

CASE BOOK

WARREN J. KING: EDITOR



SORTER-CONVEYOR MAKES SHORT WORK OF 3000 PACKAGES AN HOUR . . . SEE PAGE 153

HIGHLIGHTS: Five-story handler (p. 153) . . . pipe shop on wheels (p. 155) . . . four smart time savers (p. 157) . . . policy on tape (p. 158) . . . quality by the hour (p. 160) . . . five-day clean-up saves $25,000 (p. 161) . . . newest motion timer (p. 162) . . . all done with air (p. 166)

FACTORY CASE BOOK

NO. 12 SEPTEMBER 1958

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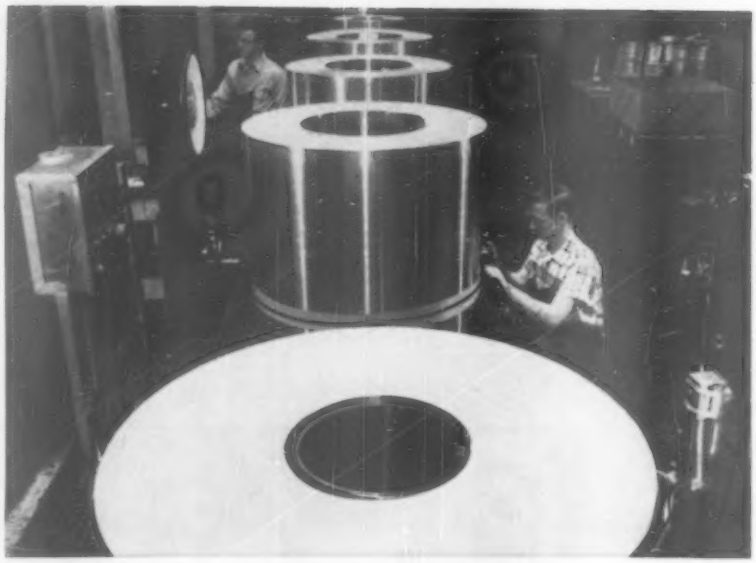


Conveyors Save $18 an Hour

Inspecting and packaging aluminum sheet coils that weigh up to 10,000 pounds is no easy job. But at Kaiser Aluminum & Chemical Corporation (Ravenswood, W. Va.) it's easier, faster, more efficient, and safer than it used to be. And this new powered inspection and packaging conveyor system is the reason.

The new conveyor saves an estimated $18 per operating hour by:

- Eliminating as many as five delay points.
- Reducing distances sheet and packaging materials travel by up to 655 feet.
- Cutting factory space needed for inspecting and packaging by over 3600 square feet.

Designed by Kaiser and fabricated by Standard Conveyor Company (St. Paul), the system has two distinct parts— a long powered inspection conveyor and a gravity-feed packaging conveyor. The inspection conveyor is 123 feet long and is powered by a 25-hp., 300-rpm., d-c motor. This section can accommodate a maximum load of 110,000 pounds, operates at variable speeds up to 40 feet per minute.

The packaging roller conveyor, on the other hand, has a slight tilt allowing skids of coiled sheet to be easily pushed along its 78-ft. length. A 5-ton, floor-operated overhead crane is used to transfer coils from the inspection conveyor to skids on the packaging conveyor. Besides cutting distances and saving on operating costs, the new conveyor system assures individual weights for each coil. These weights are easily read from the automatic scale built into the inspection conveyor line. A hydraulic lift elevates each coil about an inch to place it on the scale.

Safety is another key advantage to conveyorized handling of heavy coils. No crane or power truck need come closer than 15 feet to crew members. And all catch points on conveyor have been eliminated or protected. So—no danger of workers getting feet, hands, or clothing caught in moving parts.

Company Pays Tax on Suggestion Awards

More cash for bright ideas is the result of the new suggestion award policy at Allis-Chalmers Manufacturing Company's Norwood (Ohio) Works. Under the new policy, the company absorbs the employee's federal withholding tax on suggestion awards at the rate of 18%. Gross payment is arrived at by dividing stated amount by 0.82. For example, gross amount of a $10 award is $12.20. Employee gets a check for $10; the $2.20 is added to his regular earnings check to take care of the federal withholding tax.

CAR WENT THATAWAY

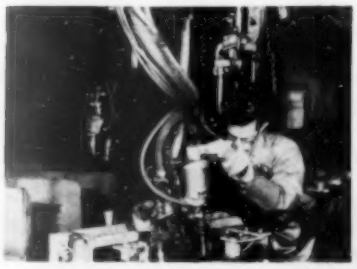
One man at master console controls flow of traffic through first half of trim department at Ford Motor Company's new Mercury plant (Rivera, Calif.). Ten push-buttons control live rollers and lift tables that move bodies from the side transfer conveyor at right angles to one of the trim storage conveyors, and vice versa. In all, the operator can perform 32 different transfers, tying together 21 different conveyors. System was designed by Link-Belt Company, Chicago.

on film rollers to a thousandth of an inch. With a Kodak Reflecting Axicon, mechanics can align vertical banks of rollers or extend the center line of a machine.

Package Sorter Sets New Speed Record

(Cover story)

Packages get rush treatment at Railway Express Agency's Long Island City (N.Y.) terminal. Operating at speeds from 100 to 300 fpm., an electrochemical sorter-conveyor system does all the work. Man in viewing booth routes packages according to destination via a control keyboard. Then photo-electric eyes measure length of package, relay information to the proper transfer. Here just the right number of steel triangular fingers move shipments down auxiliary conveyors.



Dual-Control Gun Speeds Assembly

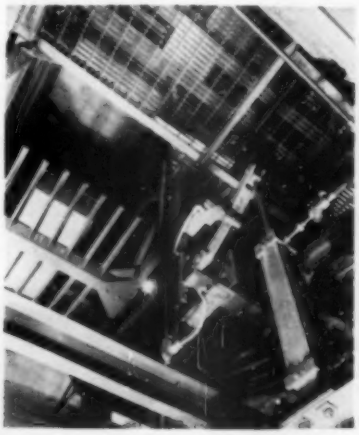
With a magazine-fed, portable nut gun (photo) Cadillac Motor Car Division of General Motors (Detroit) can weld radiator cradles faster. And, since the gun operates at any angle, it can handle any job. Complete cost: roughly $6500.

A revolving hopper loads and positions weld nuts in the removable magazines. The latter are attached to the gun, and a transfer unit feeds nuts to the business end as they're needed. Two magnetic fingers hold the nut in position during welding. If a nut is improperly positioned, the gun won't fire.

The gun (Martin Electric Company, Detroit) has two controls. One, on the back of the grip handle, operates the transfer unit. The other, on the inside portion of the handle, controls firing.

To a Gnat's Eyebrow!

This new system of optical alignment gives fast, accurate measurement of industrial roller alignment. This is important at Eastman Kodak Company to prevent lateral edge creeping of webs of film, plastic, fabric, or paper. Here mechanics at Kodak Park Works (Rochester, N.Y.) use an autocollimator (right) and flat mirror to check parallelism



Five-Story Handler

You're looking up the shaft of a five-story "ferris-wheel" conveyor that's part of the highly mechanized materials handling system at the new Diana Stores warehouse in New York City. It picks up cartons at the receiving dock area and distributes them to the proper storage floor. Over-all handling system (engineered by Dasol Corporation, New York) is geared to handle an average of 150,000 units daily.

As a result of improved handling, Diana's distribution costs at present operating level will be greatly reduced—and will drop even further

as volume increases. However, equally important is the better efficiency and accuracy with which merchandise moves from this warehouse to Diana's 208 stores.

"Brains" of the system is a series of electromechanical memory units that store information about each package, use it at just the right time. As cartons are loaded on the ferris wheel platforms, their destinations are dialed into the control unit. On reaching proper level, a limit switch and electronic beam (photo, right) trigger the mechanism to comb the carton off the carrying tray (left). Carton then travels by gravity conveyor to its exact destination on the floor.

Big Wheel Runs Smoother

An unusual problem in smooth starting and stopping faced Inspiration (Ariz.) Consolidated Copper Company, where they pour molten copper for anodes into molds on the periphery of a 25-ft., 25-ton wheel (photo). The copper solidifies as the unit rotates, is ready for removal next time around.

The critical part of the cycle is during cooling. Any jerking or sloughing in the two-speed motion of the wheel disturbs the crystal structure, causes problems in the electrolytic processes that follow. But, by using a magnetic amplifier, Westinghouse Electric engineers were able to provide smooth, jerk-free acceleration and control until "top-speed" of 0.24 rpm. is reached. After a set interval at this speed, the wheel slows down smoothly to 0.024 rpm. in 10 to 25 seconds. Complete cycle takes 1½ minutes.

	1st Level Supervision	Department Heads	Staff Personnel	Staff Dept. Heads	Superintendents	Technical & Professional	Top Management
HUMAN RELATIONS	1	2	1	1	4	2	3
EFFECTIVE SPEAKING	2	5	2	5		3	2
CREATIVE THINKING	5	4	3		1	1	1
SUPERVISORY RESPONSIBILITIES	3	3	5	4			
MANAGEMENT CONTROLS		1	4	2	5	4	4
COMMUNICATIONS				3			5

A NEW LOOK AT TOP TRAINING INTERESTS

This little chart quickly tells the tale of a National Management Association survey of its members' interest in educational subjects. While a wide variety of subjects were covered, those in the chart had the widest appeal. But note the difference in importance that showed up from job to job. Creative thinking, for example, is rated fifth in order of importance by first-line supervisors, but first by superintendents, technical and professional people, and top management. All adds up to more evidence that different responsibilities require different training subjects and methods.

Big Substation Goes Indoors

Probably the biggest electrical substation—33,000 volts— ever placed inside a plant! That's what you are looking at above. It's in the Collegeville (Pa.) plant of Superior Tube Company. Big advantage? Inside location permits expansion of plant buildings in any direction without moving the substation to make room for new construction.

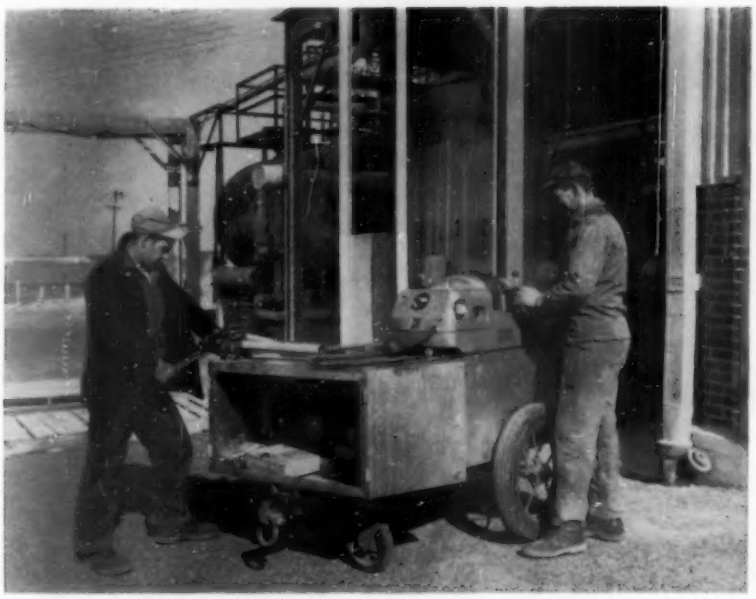
In doing this, however, Superior had to:

1. Provide ventilation to cool the transformers.
2. Guard against transformer fires; contain them if they occur.

Here's how Superior's engineers overcame these obstacles. First they designed and built a special concrete-block vault to house the three transformers. Next cooling air was introduced through the screened opening in wall (right). It flows into the vault, over transformers, through a duct on the opposite wall and out to the roof.

For fire protection, heavy metal slats like those in a venetian blind are installed at the air openings. Normally the slats are held open by a chain with one fusible link. If fire breaks out, the link melts, and the slats automatically seal off the openings. With air supply cut, the fire suffocates.

This substation, designed with the aid of Philadelphia Electric Company, is located in the basement of Superior's main plant and doubles present transformer capacity.



PIPE SHOP ON WHEELS CUTS FIELD WORK TIME 10%

This new portable pipe shop is saving one hour in ten for maintenance mechanics in the field at Curtis Bay (Baltimore) Works of Davison Chemical Company, Division of W. R. Grace & Company. Means fewer time-consuming trips to shop or storeroom. Trailer is all-aluminum for lightness and resistance to corrosion. It carries pipe-threading machine and pipe vise, and has plenty of space for fittings, tools, and supplies. Designed by Davison's engineering and maintenance department, the completed truck, including all accessory equipment, cost $1270.

Sure Way to Assure Special Services

Here's a new deal—maybe a future trend. Get other companies supplying special services to build plants next to yours. It's what Linde Company, Division of Union Carbide Corporation, did for Kimble Glass Company, an Owens-Illinois subsidiary, at Columbus.

The special-service facility is a new oxygen-producing plant with a 10-ton daily capacity. It's located adjacent to Kimble manufacturing facilities, and will be maintained and operated by Linde.

That's not all. In addition to the oxygen plant next door, Linde is providing a back-up of "Driox" liquid oxygen. Thus, if for any reason the plant is unable to meet Kimble's oxygen demands, Linde is prepared to deliver liquid oxygen from one of its many "Driox" distribution stations. In this way Kimble is assured of an adequate, continuous supply of low-cost, high-purity oxygen in case of emergency.

Infra-Red Heaters Chase Moisture

They're using infra-red heaters in the Portland (Ore.) warehouse of United States Steel's Supply Division to guard against corrosion of stored stock. The heaters (see photo) provide automatic control of condensation by regulating humidity throughout the big room.

A total of 68 heaters beam rays at an angle of 30 degrees. Parabolic reflectors insure long-distance transmission of concentrated heat rays for the year-'round system. It goes into action whenever the dew point of air inside the building varies in relation to the temperature of the stored steel. Remains on until the temperature of the steel rises approximately 12 degrees above the "sweating" point.

Clock-Stoppers

How do you combat downtime? Why not make it a game? That's what they do at Champion Paper and Fibre Company (Hamilton, O.). They've erected a scoreboard near each papermaking machine. Clock at left (photo) keeps track of downtime for current day's operations. Charts at right show past performance.

Object is to "Stop the Clock." And it's working. Every time a machine stops, the clock starts up. Ticks off dollars lost by stoppage—at rate of $23 per minute.

Does Two Men's Work

Used to take at least two men at Hotpoint Company's Milwaukee plant to load, unload, and stack a trailer-train load of galvanized water heater tanks. Solution to this

costly problem was a vacuum unit (Vac-U-Lift Company, Salem, Ill.) attached to a regular fork-lift to handle two tanks at a time. Vacuum pads follow curvature of tanks. Results? Labor savings of 40%, with 80% faster handling, and better use of space because higher stacking is possible.

Heavyweight Lifter

Pallet lifter (photo) makes short work of moving 15,000-lb. coils of tin plate at Jones & Laughlin Steel Corporation's Aliquippa (Pa.) plant. It's the new method of shipping tin plate to manufacturers of tin cans. Old way was to ship flat newspaper-page-size sheets.

Arms of lifter (Heppenstall Company, New Brighton, Pa.) slip easily under pallets, support both pallet and coil. Lifter positions loaded pallets on freight cars or barges. Counterbalance on each hoist keeps it level at all times, loaded or unloaded. Capacity of lifter is 18,000 pounds. Standard coils handled are 34½ inches long, contain tin plate for more than 110,000 cans.

New Crate Saves 26%

They're saving 26% in packaging delicate aircraft parts at Garrett Corporation (Los Angeles). Key to this healthy saving is re-usable slotted-angle steel "crating."

Formerly wooden boxes required an interior framework to hold equipment securely. This boosted freight costs sky-high. With slotted angle, machinery is well protected in an inexpensive cardboard carton.

Slotted angle (Acme Steel Company, Chicago) is made from cold steel with an electro-galvanized finish. Angles are simple to assemble, easy to bolt to equipment being shipped. Frames can be bolted together in minutes because holes line up in any position. There are no brackets, braces, clips, or hooks.

No Dust in the Eyes

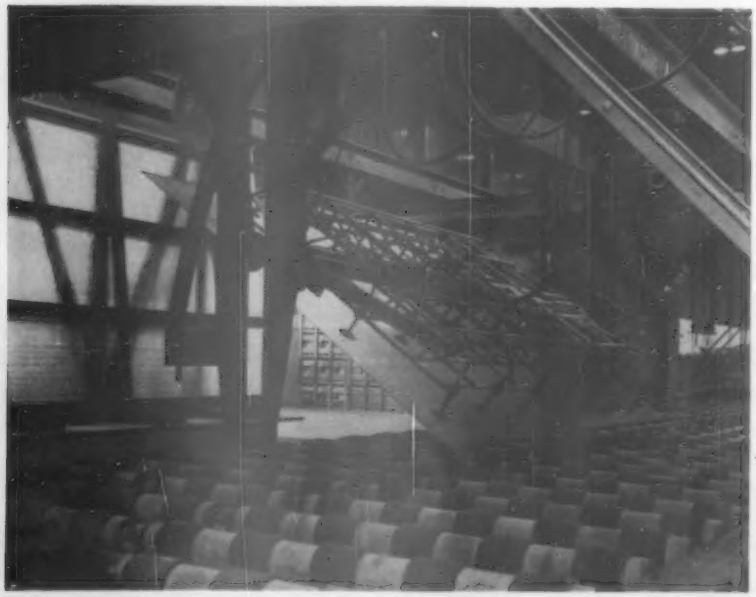
Dust clouds swirling in the faces of workers the instant a compressed air line is disconnected from its floor socket, is an old problem. But there's a new answer at Nelson Electric Manufacturing Company. It's a simple check valve that's fitted to the end of the hose.

Special requirement: The valve fits easily into the existing hose sockets, which were too small to take any of the standard valves on the market. To provide the necessary safety, the valve seat is designed to provide an imperfect seal by means of a slight notch. This eliminates the "dumping" action of the hose at disconnect, but allows compressed air to bleed from the line within seconds after disconnect.

Here's the rundown on valve construction: Bushings similar in appearance to pipe bushings screw into ends of a standard line coupling. Between the bushings a steel valve ball with a blocking pin on the outlet side prevents reverse closing. Snap fitting is at one end of valve, hose at other.

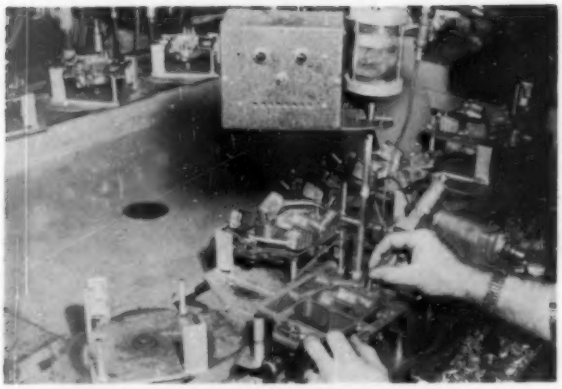
Payoff: There hasn't been a single dust-cloud eye injury at the plant since the new installation.

Source: S. O. Jones, Plant Engineer, Nelson Electric Manufacturing Company, Tulsa.

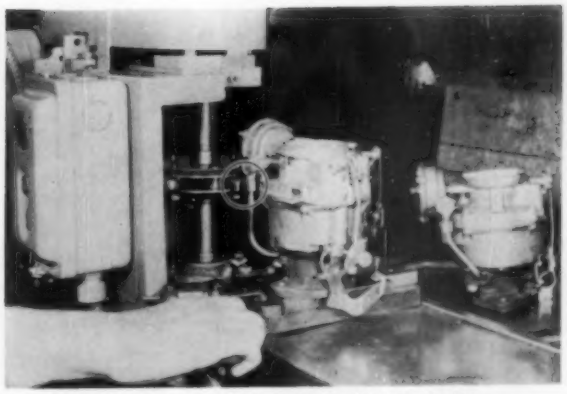


HANDLES WITH CARE (AND A GOOD THING IT DOES!)

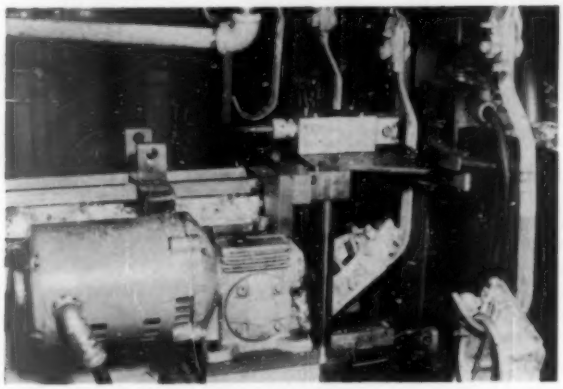
This 120x170-in. sheet of rough plate glass has just come from the annealing furnaces at Ford Motor Company's new Nashville (Tenn.) Glass Plant. The vacuum unit controlled by the operator in the cab lifts the sheets from the 135-in. power conveyor and stores them on A-frames to build up a reserve supply for faster grinding and polishing operations that follow. Furnaces operate seven days a week compared to polishing line's five in order to maintain a balance in production.



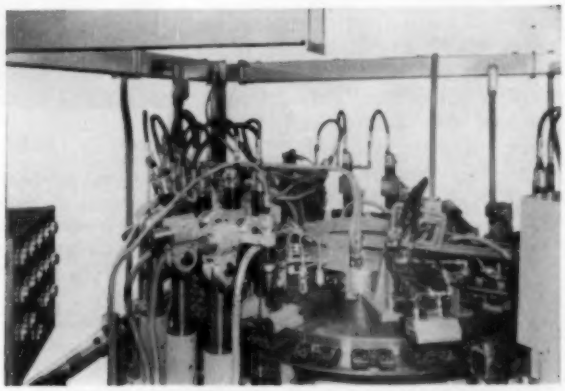
1. LIGHTS TELL WHAT EYES CAN'T . . .



2. DEVICE TIGHTENS FITTINGS ON ITS OWN . . .



3. LOADER, NOT MAN, DOES THIS JOB . . .



4. BURRS GET THE HEAVE-HO AUTOMATICALLY.

Four Smart Plant Time-Savers

Chopping precious minutes off production time is a top-priority mission at Rochester (N.Y.) Products Division of General Motors Corporation. Improved equipment and procedures have played a big part in boosting productivity. Here's a rundown on four changes that are saving plenty in time and money:

1. Bubble tester—Fuel inlet needle valves have a way of leaking. That's why this electronic bubble tester is a handy device. It's sensitive, accurate, and rapid. Formerly, needle valves were checked by subjecting them to a vacuum source. A bubble chamber, partially filled with liquid, was placed in series with the vacuum line. Leaks showed up as bubbles of air being drawn through the chamber. Determination of a good or bad part depended upon an estimate of the distance between bubbles.

The new tester uses a small sensitive photo cell placed inside the bubble chamber. Bubbles pass between it and a light source. If frequency of bubbles is less than a predetermined rate (indicating a good part), green light flashes; if greater, red light flashes.

2. Fitting tightener—This device automatically tightens heat tube fittings on single jet carburetors. The fitting is engaged and turned by four pawls mounted on a motor-driven disk. As the disk revolves, each pawl in turn momentarily engages the fitting (circle) and tightens it a partial turn while the carburetor assembly is held on a pivoted and spring-loaded mount. When the desired torque has been reached, the last pawl engaging the fitting exerts an outward force. This causes the carburetor to swing away from the tightening mechanism into the unload position.

3. Almost-human loader—This machine swings carburetor parts on their way to another step in the cycle by a series of sensing devices and switches. As each die casting enters the loader, its presence is sensed by a limit switch. A ram slides it on a pair of wide, silent chain belts that move it toward the chain conveyor transfer point. Friction is great enough to carry the casting along, but small enough to let the belt move under a casting that may be stopped. As one casting leaves the belt, the next butts it on a small elevator platform directly over the path of large "U" hooks on the chain conveyor. When a hook is directly under a casting, elevator drops abruptly, hangs casting on it. After a brief delay to permit hook to pass on, the elevator returns to its original position to receive the next casting.

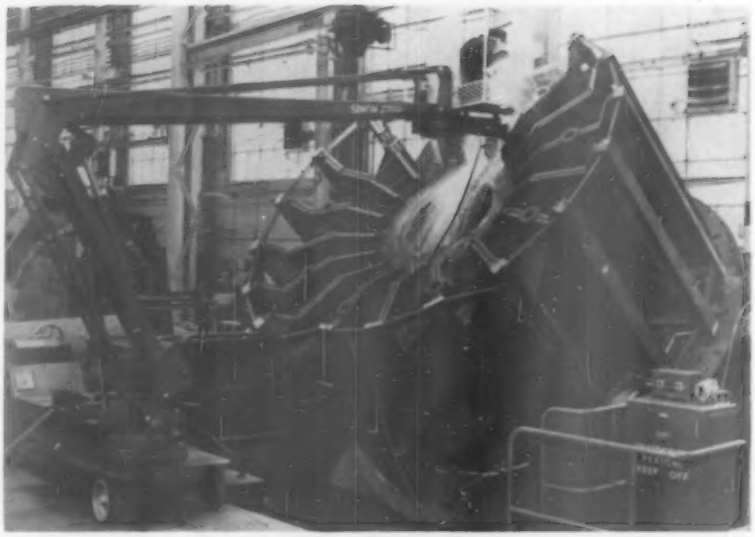
4. Deburrer-flusher — This 24-station machine automatically deburrs and flushes the Venturi Cluster casting, a critical part of the Rochester carburetor. Zinc die castings have several intersecting small holes that

create internal burrs. Formerly, the operation required several workers using drills, reamers, and burr tools driven by air. Final flushing (to remove chips) was done on a manually loaded fixture.

The new indexing dial machine requires only one operator to load the castings. Then they're completely deburred, flushed, and automatically unloaded on a belt conveyor. Up to 18 deburring operations are performed on each casting.

By means of selector switches, 23 different models can be run on this machine. Air-feed drilling units drive the drills, reamers, and burring tools. Other deburring operations are done with a revolving wire brush and a broach.

After being completely deburred, castings are automatically transferred to a stationary flushing station. Here they are flushed with oil at a pressure of 55 psi.



MECHANICAL GIRAFFE BOOSTS WELDERS

Nothing's out-of-reach for this hydraulic platform (Simon Engineering). Attached to an electrically propelled truck, it can stretch its long "neck" to get workers to any seemingly inaccessible spot within 30 feet of the floor. All movements are controlled from the work platform. Welder in photo is working on large hydro-electric alternator held in 25-ton positioner at Metropolitan Vickers Ltd. (Manchester, Eng.).

Urethane Foam Cuts Insulation Costs

Urethane foam helps trim insulation costs at E. I. duPont de Nemours & Company's Washington Works (Parkersburg, W. Va.). Three types of insulation are now being used. All three show impressive savings.

• *Snap-on* urethane foam for pipe insulation cuts installation costs as much as 40%. Needs no joint or other adhesives as long as a vapor barrier finish is used. Asphaltic based mastic provides this barrier in below-ambient-temperature applications while an asphalt breather emulsion does the job for hot service. Hexagonal poultry netting or a mesh of neoprene coated rayon reinforces these barrier coatings.

• *Blanket* urethane foam insulation saves up to 25% in installation costs over conventional blanket or block glass fiber, according to Du Pont engineers. To date some 30,000 square feet of this material has been used at Parkersburg. It used to take three or four days to reinsulate certain equipment. Now it takes only two days.

• *Cast-in-place* urethane foam for special valves and fittings results in savings as high as 50% by eliminating prefabrication of many shapes. Forms around fittings are set up in advance. Then two men working together go from one form to another, pouring the foam into the cavities (photo). A special box containing a 200-watt bulb preheats catalyst and resin (containing isocyanate) to simplify casting. Box also contains a scale and a calibrated flask for measuring components. A chart tacked to the box tells workers the proper mix formula.

Using urethane foam insulation has another advantage. This one material takes care of all types of insulation within the temperature range from minus 70 to plus 270 F. Easy for insulators to handle, this lightweight material bonds directly to metal with proper cements in just 3 minutes. Has an unusually good K factor of 0.28.

Policy on Tape

The spoken word is the best way to communicate policy. That's the experience at General Services Administration. Reason is the importance of communicating the *why* of new idea along with the *what*. Here field offices present a problem. Since the new policy can't be talked over, they are quite likely to get a stuffy directive.

Solution: tape recordings. They carry more detail than a written directive can afford to. And they have color. The intonation of the speaker's voice brings ideas to life.

Reaction is unanimous — field men like it. The San Francisco office reported: "Tapes definitely do something for morale." Atlanta said: "We have run the supply tape many times, not only for our own people, but for customers as well." From Seattle: "Almost as good as a visit from the home office."

Magnetic tape is cheap, re-usable, easily handled, mailed, edited, spliced. A 7-in. reel costs about $2, records for 2 hours at 3.75 inches per second. Tape stores well, is unaffected by ordinary handling or atmospheric conditions.

Recorders run around $300.

ONE DISPLAY IS WORTH 10,000 WORDS

Display board at Lockheed's Missile Systems Division (Sunnyvale, Calif.) speeds order-filling of electrical parts. An electrician can spot what he needs at a glance whether or not he knows the proper number and name. All he has to do is point to it. Saves both himself and the crib attendant the labor and aggravation of long, involved descriptions. Attendant can fill request promptly, accurately.

Since voice is much less critical than music, there is no need for "hi-fi." Preferably there should be a recorder at each "receiving" location and two for the home plant.

The mechanics of making a recording are simple. Record at 3.75 speed, in a quiet room. A neck microphone is useful if recordings must be made amidst the noise of the office. Recordings of from 20- to 30-min. playing time should be adequate for most subjects. The old adage, "the mind can absorb only what the seat can stand," applies.

You may also want to try tape as soundtrack for company-produced slide films or movies, as a public address system (many recorders have this feature), or as a handy means of polishing up a speech.

But, as in any other method of communicating, sound recording has its weaknesses. Since tape recording appeals only to the sense of hearing, it's not an especially good means of instructing people. It can be a valuable aid, but should not be called upon to carry the instruction itself. Where instruction is the objective, particularly for detailed procedures, the method should be on paper. But the *why*—or the thinking behind the method—may be on the recording. Material for future reference is also a poor subject because it usually has to be transcribed at the receiving end.

Source: M. C. Anderson, Training Officer, General Services Administration, Arlington, Va.

Better Way to Handle the Gift Problem

"What! Another collection?" Every manager has heard this irritated comment. And maybe he has voiced the same objection himself after four collections in one month. Problem is to find a "better way" to handle the gift requirements of any group of workers when one of its members has a family death, gets sick, gets married, leaves the company, etc. Usual "on the spot" collecting is inequitable to givers and receivers. And it's irritating.

Solution worked out by employees at National Safety Council can be adapted to the needs of almost any company. Plan has stood every test for 12 years and is well-liked: Here's how it works:

1. Every other payday, each employee puts a quarter in the kitty. This replenishes what is called the "staff fund" to provide gifts for all occasions. No other collection is authorized (Red Cross and Community Fund drives excepted). Thus the maximum cost to any National Safety Council employee for all gift purposes is $3 per year.

2. Every employee, under this plan, receives gifts or remembrances from the entire staff, according to an established scale. (Scale runs like this: $3 for flowers or a book during an illness; $10 for flowers for a funeral; wedding gifts based on length of service, starting with $4 for two months' service; and departure gifts that start with $6 for one year's service).

3. Fund committee is made up of 5 employees (approved by management). Committee names 12 employees to collect the quarters. Committee members change each year.

4. On each collection payday, attractive signs reminding employees to "feed the kitty" are placed on all bulletin boards, and the collectors make the rounds.

5. Supervisors notify the fund committee whenever an employee is eligible for a gift. Length of service is verified by the personnel division. A check for the appropriate amount is issued to a friend of the employee to buy a gift.

6. The personal touch is maintained by having a friend of the employee make the presentation at a get-together for the employee.

7. When new employees are hired, they are given information about the operation of the plan.

8. Accounting is made of all money handled with regular statements published in the employee publication.

Source: Aline Thompson, Director, Personnel Division, National Safety Council, Chicago.

Never Drops a Load

And that's important when you're handling 1000-lb. wooden barrels of whiskey. Custom-built portable lift unit (photo) operates at receiving entrance of Joseph E. Seagram & Sons' warehouse, (Milan, Ind.). Loads and unloads trucks on two levels, lowering barrels to ground where it automatically tilts so barrels roll into warehouse.

Lift unit (The Colson Corporation, Somerville, Mass.) can stop and tilt at any level within its 8-ft. vertical span. Loading or unloading cycle takes roughly 10 seconds, including an automatic delay to assure proper positioning of barrel in cradle. Unit is electric-hydraulic powered and completely weatherproofed, including controls.

Quality by the Hour

"How is quality today?" This is a common question put to quality control supervisors and foremen. To provide a ready, up-to-the-minute answer, the O. A. Sutton Corporation, manufacturer of air conditioning equipment, supplies quality information on an hourly basis. Uses signal boards placed at strategic points to spread the word. When a red light is on, it means that a department's quality is out of control.

Once an hour department inspectors relay defect information from their stations to a central control desk. Here the information is compared with pre-established control limits for pertinent defect groups. This indicates whether an area is in or out of control.

For areas in control, the red lights stay out on boards in the offices of quality control, the plant superintendent, and vice president of manufacturing. For areas out of control, the red lights go on.

Control limits established for hourly calculations at Sutton are based on groups of defects rather than individual ones. For example, the assembly line troubles fall into four classifications—major, service call, customer irritation, and factory correction defects. Grouping of these defects simplifies the hourly calculations.

Naturally, grouping defects gives an over-all status picture instead of pinpointing trouble spots. As a result, production leadmen and foremen review inspectors' reports frequently to spot cause for departments being out of control. Inspectors cooperate by advising production personnel when repetitive defects occur so action can be taken "before the light goes on in the boss's office." Result: 95% of quality problems solved at the line level. To supplement hourly checks, plant management receives a daily report on quality. This highlights specific trouble spots in the previous day's production.

Source: R. G. Cordes, Director of Quality Control, O. A. Sutton Corporation, Wichita, Kan.

Monitor Probes Bearing Failures

When bearings fail at Hyatt Bearings Division of General Motors Corporation (Harrison, N. J.), the test engineers always know *when* and can find out *where* and *why*. Reason: Sherlock in the shape of a small vibratory monitor (photo).

This monitor, known as Vibraswitch (Robertshaw-Fulton Controls Company, Anaheim, Calif.), stops the test apparatus the instant failure occurs. Engineers can then move in to pinpoint the exact location of the breakdown. And discovery of the stress often leads to discovery of the cause.

Bearing endurance tests are carried out on special stands designed to simulate operating conditions. Before engineers hit on the idea of using Vibraswitches on the test stands, technicians had to depend on their ears to detect bearing failures through changes in sound emitted from the apparatus. Method was okay when an ear was close. But tests go on around the clock until a failure occurs. This might take anywhere from 10 to 1000 hours. And failure can happen in the dead of night when no one is around. When that happened, the time elapsing before men got back to the plant was enough to damage bearings beyond fruitful analysis.

Insulation Wrapper Speeds Job 25%

New insulation wrapper (photo) can pay out any combination of paper, cotton, or glass-fiber insulation tapes at 25% greater speeds than old mechanisms. This brainchild of the assistant plant engineer of Rome Cable Corporation (Rome, N.Y.), also cuts down machine vibration, operates at 4000 rpm., and has sealed bearings lubricated for life. Thus, with no oil leaking, cleaning isn't the constant problem it was with old insulation winders.

The wrapper has a two-piece hollow shaft. The rear portion is rigid and integral with the mounting flange. Another plus feature: Tension of insulation tape can be adjusted while machine is running to insure a more uniform wrapping.

BIG "CLEAN UP" PROMOTION . . .

YIELDS A BOUNTY OF SCRAP . . .

AND USABLE PARTS AND EQUIPMENT . . .

PLUS A NEATER LOOKING PLANT.

Five-Day Clean-Up Push Saves $25,000

More than $3000 worth of wire and iron scrap; $8100 of brass and bronze; and $9000 of copper tubing and pipe. Also, long forgotten bearings and gears worth $1500, hundreds of dollars' worth of nickel, and other metal scrap. All this was the result of "Treasure Week" at E. I. duPont de Nemours & Company's Waynesboro (Va.) Works.

The office force participated, too. One office turned up $100 in surplus stationery, hidden away in a storage locker. The legal department secretaries found letter trays, broken pens, excess paper clips, and the like. And these small items all add up to big savings. For example, Du Pont spends $7000 a year for paper clips. Any saving along these lines makes plenty of sense.

Clean-up campaigns are not new at Du Pont. A crew of 16 maintenance painters and six laborers work the year round keeping the Waynesboro Works neat and clean. But over the years, scrap, supplies, and unused equipment pile up.

The Salvage & Reclamation Division, working out of Du Pont's Wilmington office, decided something new would have to be done. They dreamed up a company-wide "Treasure Week" promotional campaign. Gave it wide publicity.

Posters were put up around the plant. Collection points were established. Employee bulletin boards announced "Treasure Week," gave reasons for the project. Foremen were called in and briefed on the program, then told to pass the message down the line. A "Treasure Week" girl was selected, and her picture in a pirate costume was run in the company paper. The city of Waynesboro got into the program, too. Arranged for a city-wide clean-up campaign to match the plant's.

The clean-up program had five purposes—(1) prevent waste, (2) promote safety, (3) improve housekeeping, (4) keep inventories down, and (5) recover tied-up capital.

The 2700 plant employees took to the task with a spirit. Their bonus: a better looking, cleaner place to work.

Punch Card PM Pays Off Fast

Here's a preventive maintenance routine inspection program that's literally full of holes—punch card holes, that is. At M & M's Candies Division of Food Manufacturers, Inc. (Newark, N.J.), a new punch card system schedules routine inspection of some 900 motors. The system tells maintenance personnel when inspections must be made.

That's not all. The punch card master file also provides a fast method of determining how many motors of each classification are on

YOU BE THE ARBITRATOR

THE CASE OF

The Overtime Tool Crib

Out of the experience of the American Arbitration Association

One day the machine shop foreman asked a number of men to work a few hours' overtime. All agreed except the toolcrib clerk, who begged off because he had to attend to an urgent personal matter that evening.

On thinking it over, the foreman decided he didn't need a toolcrib man. He simply told the machinists to draw their tools before the end of the shift. Didn't ask any other tool clerk to stay late.

Soon after, the union filed a grievance on behalf of the next senior toolcrib man. "When the first man refused, the second on the list should have been asked to work," said the shop steward.

"There are two things wrong with this grievance," said the foreman. "First, the second man on the list didn't complain himself. As long as he's not claiming discrimination, the union has no case. Second, we follow seniority when offering overtime. But there's nothing in the contract that says a toolcrib man has to work overtime when machinists do. Nobody worked out of classification, so there's no contract violation."

Eventually the case went to arbitration. Suppose you were the arbitrator. How would you rule?

For the actual decision turn to page 166

hand—which is a big help in determining spare motor requirements.

How it works: Every week the IBM group in accounting issues a stack of cards, one for each motor to be inspected the following week. Also issued is an IBM "run" or typed list of inspections to be made. Cards were duplicated from a master file which had been automatically sorted to select the proper cards. The list was automatically typed from the duplicate cards.

Upon receipt of the cards, the maintenance engineer forwards them with a covering work order to the motor maintenance electrician, keeping the typed list. Standard inspection procedures are outlined in the electrician's manual. After each inspection he writes on the face of the card any changes to be made in the information listed. On the reverse side he notes any major repair work necessary.

Cards are then checked against "run" to see that all were returned, and "run" is destroyed. Corrections are returned to IBM department for revision of master cards. The maintenance clerk issues work orders for approved repairs.

Motors were chosen as a starting point in cutting maintenance bookkeeping because there were more motors than any other type of equipment requiring substantial maintenance. Prior to this system M & M had no motor preventive maintenance program. About 100 man-hours in the plant engineering department over a period of several months and about the same number of hours in the IBM department were required to set up the system. A small amount of follow-up is required, too, to see that the accounting department receives all motor transfer, sale, purchase, or scrap notices.

M & M uses the 80 columns on the card to record tag number of machine, name of machine, power source, horsepower, speed, voltage, manufacturer, frame number, driven machine number, location in plant, week number, and type inspection.

The system began to pay off right away. Today the electrician has his work cut out for him a week at a time, scheduled at a realistic pace. Rush calls have dropped off.

According to Leif Poll, maintenance engineer involved in its development, the system could be easily adapted to other automatic (or even manual) card sorting systems. The company plans to extend it to other equipment as soon as the planning time is available.

Newest Motion Timer and Recorder

Semtar stands for Sequential Electronic Motion Timer and Recorder. It's an automatic electronic timer and recorder developed by the Industrial Engineering Division at University of Minnesota's Institute of Technology. Initial application will be in basic research on hand motions used in industrial and clerical work and checking established predetermined time systems. With minor modification, it could be used for psychological, engineering, and medical research.

Outstanding feature of Semtar is

its ability to "automate" recording of elapsed time for computation by tabulating and electronic-data-processing equipment. It identifies and records elemental time values on 5-channel punched tape. After conversion to punch cards or magnetic tape, computers can readily supply statistical analyses from these data. Semtar also has these eight important characteristics:

1. Measures short intervals to an accuracy of 0.001 second.
2. Excludes observer errors and reaction time because it records motions automatically.
3. Clocks time values from zero, thus eliminating the need for subtracting successive values.
4. Provides read-out and coding of elapsed time on tape.
5. Automatically identifies element time values.
6. Measures and records successive elements with minimum times of 0.083 second for one-hand or 0.133 second for two-hand cycles.
7. Handles two related time values simultaneously (such as for symmetrical two-handed motions).
8. Permits manual (visual) read-out of electronic clocks.

As presently constructed, Semtar permits automatic measurement and recording of time intervals under a wide variety of conditions. And design and construction allow relatively simple conversion to an even greater range of possibilities. For example, by use of available digital meters and interval clocks, it could record, at desired intervals, temperature, pressure, or velocity.

But Semtar can't do everything. For example, the circuit design allows independent timing of the two hands and does not require that motions be initiated or completed at the same instant. However, a single identification code applies to both left-hand and right-hand time values. Thus two-handed operations must have similar motion patterns, and the subject must not be more than one element out of phase.

Electrical impulses isolate cycle times for elements under observation. Proximity relays, body-contact relays (or flip-flops), photo-electric cells, or micro-switches accomplish this. Body-contact relays are especially helpful for measurement of *grasp*, *insert*, or *manipulation* elements. If a workpiece is designed so relays remain closed during certain elements such as *grasp* and *insert*, Semtar also records the time for intervening elements (such as *reach* and *move*) when the relay is open. Thus, for psychological experiments of reaction time, for example, Semtar records the time from the beginning of a stimulus until the subject responds.

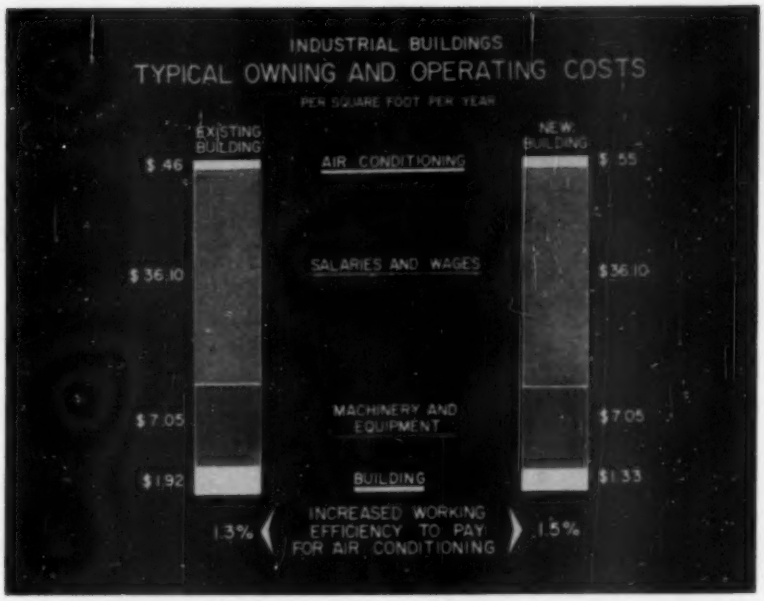
When recording individual time values, the analyst gets an accurate and complete record of the frequency distribution of elapsed time (for each element for each subject and under each experimental condition). This permits the exclusion of extremely high or low values (due to fumbles, etc.), and the computation of standard deviations, significant differences of means, and other statistical tests.

Semtar's timing unit consists of an oscillator set for 100, 500, or 1000 cycles per second, electronic switches and two pairs of electronic counters, each of which can count up to 999 (9.99 seconds at 100 cycles per second). By using the counters in pairs, one unit can be counting while the other one is stopped to allow the time to be recorded and the counter re-set to zero. In this way, sequential motions are timed without delay between motions. And, by having two pairs of counters, times can be recorded for simultaneous two-hand motions.

The entire set-up cost the University of Minnesota roughly $7500 to develop. Arrangements are now being made to produce Semtar commercially at an estimated cost of $5000 per unit.

Source: Stanley M. Block, Industrial Engineering Division, University of Minnesota, Minneapolis.

Contributions from readers reporting experiences will be welcomed. No need for fancy writing; just a clear concise statement of facts. If you have photos or drawings, be sure to include. We'll edit for the Case Book. Contributions accepted will be paid for at time of publication. Address: Case Book Editor, FACTORY, 330 West 42nd St., New York 36.



HIGHLIGHTS ON LOW COST OF COMFORT AIR CONDITIONING

Did you know comfort air conditioning could be installed in your plant for only about 1% of typical owning and operating costs? That goes for both existing and new buildings, according to a study (see chart) by Minneapolis-Honeywell Regulator Company and Carrier Corporation. Note also the ratio of air conditioning to labor cost (percentage figures under colums). That's all you have to boost productivity to make the air conditioning system pay for itself. Contrast this 1.3 or 1.5% with average increases in working efficiency of 25% on hot days (as reported by the study), not to mention drops in absenteeism and turnover of 30% to 40% respectively.

Halves Computer Wiring Costs

Also simplifies electronic assembly operations, eliminates errors, reduces inspection time. Those are the benefits of the $40,000 "Wire-Wrap" machine (photo) that is being used by Hughes Aircraft Company (Santa Monica, Calif.) to wire electronic panels of an airborne communications system.

The automatic unit (Gardner-Denver Company) capable of wiring terminals in a 10x10-in. panel, can be operated by keyboard or punched tape. For manual operation, the technician works from a coded wiring list that specifies the sequence of the two wrapping heads that attach wires to small rectangular or square terminals with solderless wrapped connections.

The machine lays common wire sizes in straight-lined or L-shaped patterns. Can place 10,000 wires on a 20-in.-sq. board with a modular terminal spacing of 0.20 inch.

Using Plant Paper to Tell Profit Facts

Nine tried-and-true ways to tell workers the profit-making philosophy come from The Garrett Corporation. Principal tool in its profit-selling campaign is the company newspaper. As proof of success, there have been no work stoppages in 21 years. Here are the nine tips:

1. Sell management—To tell the profit story thoroughly in the company newspaper depends first on management's philosophy and how well sold it is on the need to impress the importance of profits on employees. Management must have confidence in the company paper as a communications tool.

2. Tie profits to security—One sound theme is to interrelate profit-making to job security. Show profits are a *must* if wages are to be paid over the long run. Surprisingly enough, many workers haven't thought of it that way.

3. Make finances news—Publish company financial reports to stockholders as news stories. And print any financial stories released to the press by your company.

4. Break down the figures—You may want to break down the profit statements of financial reports, to show exactly what share of earnings goes into such functions as research and improved production facilities. Profit dollars spent for these functions spell future security for company and worker.

5. Use company reports—Your company's quarterly financial reports serve as an excellent springboard for articles dealing with profits returned to stockholders for their investment. If investors don't invest, capital necessary to operate and pay wages will not exist.

It's best to present financial reports in the same form given to stockholders. Don't rewrite them. Don't write down to employees. Made-to-order reports for employees, in language simpler than that used by accountants, just don't do the job. Employees readily conclude that you are using a tailored report to hide unpleasant facts.

Garrett's financial stories come directly from official stockholder communications. All personnel also get a copy of the annual report. Thus they can check stories in the company newspaper against it if they want to.

6. Draw analogies—You can draw an analogy between a stockholder and an employee. Each invests either cash money or his working life. As it works out, the investor gets cash dividends for his investment; the employee gets wages.

7. Editorialize—Trick here is to identify your editorial to avoid possible worker suspicion. You can use it to prove the primary reason for the company's existence is to make a profit. And perhaps paint the dire picture of consequences resulting from failure to operate in the black.

8. Do a feature story—When the situation seems to demand it, put together a center spread. Make it an attractive, illustrated presentation. You might, for example, illustrate the sales dollar, showing how the largest part goes into wages, and a much smaller part into profits and dividends.

9. Go beyond words—The corporation has a retirement and severance fund, and an annual Christmas bonus based on profits. It's a perfect demonstration of the profit story the company paper tells. And a fine launching platform for comments on the profit system.

Source: Ken Frogley, Public Relations Director, The Garrett Corporation, Los Angeles.

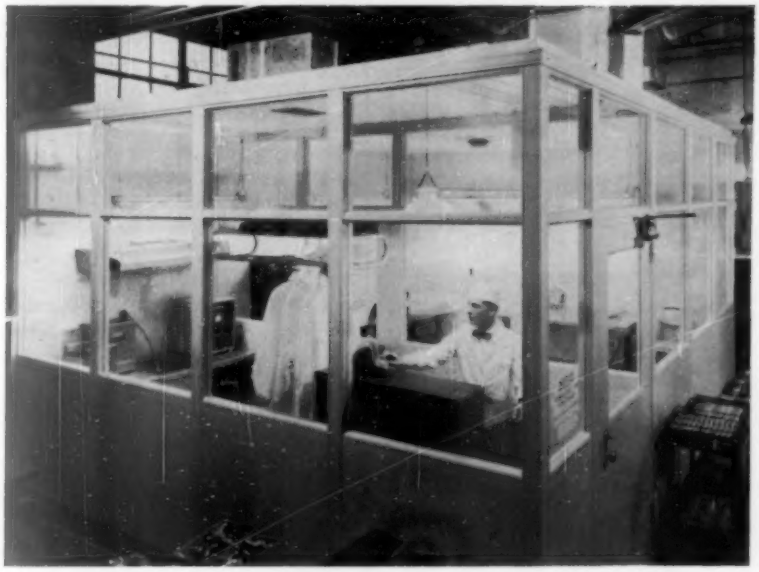
Space-Saving Radio

Space conservation is important on materials handling trucks. Reason for compactness of this radio (photo) is the use of transistors. Three fork trucks at International Parts Corporation's new 235,000-sq.-ft. warehouse and shipping center (Chicago) are equipped with these all-transistor units (Motorola, Inc., Chicago).

Builds Own Grapevine

Maybe you've noticed employees are more impressed with what they hear from "their guys" than they are with a management bulletin. To turn this problem into an asset, and to furnish a convenient way to hear employee ideas, Hamilton (Ohio) Division of Baldwin-Lima-Hamilton Corporation set up a special six-man employee-management committee.

Management is represented by the assistant general manager, factory manager, and manager of industrial relations. Employees are represented by three respected plant employees, all union members but



ALL "CLEAN ROOMS" AREN'T BIG AND EXPENSIVE

This one cost only $20,000 including auxiliary equipment. And its area is only 256 square feet. In it the Superior Valve & Fittings Company (Pittsburgh) cleans, assembles, and tests missile control valve parts. The 2-section glass-enclosed chamber is dust-free, has a 2-oz. pressure build-up to insure outward flow of air. Moisture, temperature, humidity, vibration, illumination, and noise are closely controlled. Although not suspended, the room is a shell within the plant. Technicians dress in the ante-room where cleaning is done before parts are moved (in plastic containers) to the inner clean room.

not stewards or members of the grievance committee. Reason for not appointing union officials is their conflict of interests makes it hard to maintain a constructive attitude in the solution of plant problems for even the best of men.

The committee meets monthly. Employees present ideas for improvement of the operation (but no grievances). Management reports the current business trends, competitive position, and plans for changing operations. How the information gets to the rest of the employees is left strictly up to the three employee representatives.

To get the program off the ground, management asked all employees to write their answer to this question, "Why does it take more hours to build an identical machine now than it did a few years back?" Here are the reasons most often listed—and the corrective action taken by the company:

- Lack of positive supervisory leadership. *Action taken:* The result of a relatively inexperienced supervisory force, this complaint was immediately investigated. And plans for improvement of the supervisory organization, already developed, were speeded into effect.
- Improper machine tool repair, replacement, and improvement. *Action taken:* Planned preventive maintenance was installed. Much equipment was rebuilt to reduce maintenance, improve accuracy.
- Toolcribs not stocked completely; some tools outmoded. *Action taken:* Centralized toolroom installed to reduce tool inventories.
- Incomplete planning and scheduling. *Action taken:* The function was reorganized and a punch card system installed.

The committee used these answers as a springboard to more employee ideas and management tell-all. Results of the system are demonstrated by last year's contract negotiations. After five of the quickest meetings on record, management and union jointly announced a satisfactory new contract.

Source: Frank A. Depweg, Factory Manager, Hamilton Division, Baldwin-Lima-Hamilton Corp.

CASE BOOK CAPSULES

Sub-subminiature 5-amp. switch weighing 1/28 ounce has been designed by Micro-Switch Company (Freeport, Ill.) for applications where weight and space are critical. Adequate for operating household refrigerator motor.

A $40,000 mold for the basic hull of a 15-ft. glass-fiber outboard is being machined by the Keller method at Winner Manufacturing Company (Trenton). Weighing 34,000 pounds, it will be used for pressure bag molding production.

Twelve-ton aluminum ingot will help Thiokol Chemical Corporation (Trenton) fabricate an unidentified part to improve rocket and missile performance. Produced at Alcoa's Lafayette (Ind.) works, cylinder is 205 inches long and 38½ inches in diameter.

Record-size heat exchanger for Esso Nederland N. V. uses 200 miles of 1-in. steel tubing, 400 miles of aluminum ribbon. Provides 2.6-million sq. ft. of cooling surface, according to designer-manufacturer (Griscom-Russell Company, Massillon, O.).

Faster mail sorting is the aim of a $1.5-million contract awarded Pitney-Bowes, Inc. (Stamford, Conn.). Calls for development of two prototype mail-sorting devices for larger post offices.

Giant electric furnace melts copper competitively for American Smelting and Refining Company (Perth Amboy, N. J.) in spite of a cent a kwh. electric rate. Secret: Rotary reverberatory furnace burning cheap bunker C oil pre-heats copper cathodes first.

"Put and call" arrangement for handling plant scrap has been initiated by McNichols Scrap & Metal Company (Detroit). Calls for pick up and storage for specific period with minimum price guarantee of $40 per ton. But seller has option of selling at current market price at any time before the end of the specified period.

All Done With Air

This all-air paint fixture (photo) clamps, masks, spins, sprays, and releases the work piece in 4 seconds. Result: Production jumped 30% with consequent cuts in unit cost.

It's the way they paint the edge of plastic speedometer dials at Birmingham (Mich.) Plastics, Inc. Presence of explosive paint fumes ruled out the use of electricity, so air was called on to do the entire job. An air motor turns the spindle. A rotating air cylinder clamps and masks the piece. An air spray paints each piece so it can be removed without smearing.

An unusual feature is the four-way air valve operating two single-acting cylinders. Normally such a valve operates a double-acting cylinder. However, because clamping and ejection occur within such a short cycle, one valve actuates both spring-returned cylinders.

Get Data They Need

Do your maintenance men on the night shift complain about not having access to all equipment information files like blueprints, instruction books, and wiring diagrams? They've solved the problem in the electrical maintenance department at E. I. duPont de Nemours & Company's Chambers Works (Penns Grove, N. J.). And without leaving administrative offices open.

An extra partition inside maintenance office fences off a filing room 5 feet deep across width of room. During the day both inner and outer office doors are open. At night inner door is locked, but outer is left open. This lets night shift personnel get all the equipment information they need.

Reprints of the Plant Operating Case Book are available. Price 50¢. For quantity prices write Reader Service Department, FACTORY, 330 W. 42nd St., New York 36.

Insulation Saves Money All Around

Warmer in winter! Cooler in summer! And increased illumination, too! Those are the three main benefits Barbecue King Sales, Inc. (Greenville, S. C.) got by using aluminum foil insulation in its 15,000-sq.-ft. plant. And the installation job took less than four days—without interrupting production.

Figures on the effectiveness of the aluminum insulation include a 53% improvement against winter cold, a 35% increase against summer heat, a 35% boost in illumination, a 60% cut in heating costs.

Barbecue King used Alfol (Reflectal Corporation, Chicago). It consists of multiple layers of aluminum foil which automatically space themselves about an inch apart when installed. Captive air spaces between layers add to the insulating efficiency. The bottom aluminum layer is laminated to a heavy, waterproof duplex backing that provides application support, eliminates ripping and sagging. This makes the material self-supporting, with no need for reinforcement of any type.

To install Alfol, two wood furring strips were sandwiched between the ceiling and the top of the supporting beams. Nuts and bolts secured these strips. Then the 16-in.-wide insulation blankets were recessed between them. Along adjoining edges between beams, the blankets are stapled to themselves.

YOU BE THE ARBITRATOR

Continued from page 162

The award—The arbitrator said the union had the right to file a grievance on behalf of an individual employee even if the man did not personally feel aggrieved. The union is agent for the whole unit, including employees who are not members of the union at all. On the merits of the case, however, the arbitrator held for the company. The fact that overtime was first offered to the senior man was immaterial. Nothing in the contract or in its past practice required the company to have a toolcrib man on duty, so long as no other employee was asked to do his work.

Caution: The award in this case is not an indication of how other arbitrators might rule in other apparently similar cases. Arbitrators do not follow precedents. Each case is decided on the basis of the particular history, contract, testimony, and other facts involved.

Tilts the Work to Speed the Job

TV sets "get the air" on the final assembly line at Westinghouse Electric Corporation's Television-Radio Division (Metuchen, N.J.). An air-operated tilt makes a simple procedure out of positioning and fastening the completed chassis inside the cabinet complete with paperboard shipping pallet. Photo shows worker securing the final self-tapping screws with an air-driven tool.

Before this operation, she checks chassis position. Next she'll release a safety catch, press a "return" button to transfer the set to its normal upright position, then shove set and pallet onto the conveyor (right).

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FACTORY / EQUIPMENT NEWS

Begins on page 118

For more about these items, circle item numbers on Reader Service Card next to back cover.

180—Electrical Plug Lock device adjusts to keep any size plug secure in the outlet. Installed in a minute, this inexpensive plastic device permanently prevents inconvenience caused by accidental disconnection of plant operating equipment. Cleveland Specialties Co.

181—Three Hand-Operated Drivers featuring pre-set torque have work capacities, respectively, of 0 to 25 in.-lb.; 0 to 60 in.-lb.; and 0 to 96 in.-oz. Repeated tightening, or changes in temperature, don't affect torque setting once it's made. Scully-Jones and Co.

182—Fiat-Powered Lift Trucks include gasoline, diesel, electric and propane models, all battery-equipped and available with pneumatic tires. Low price of trucks is one advantage, easy maintenance is another. Capacities from 2200 to 6000 lb. O.M. Lift Co. of America.

183—Tapped Winding Transformers quickly correct off-standard voltage conditions in areas where low-voltage electrical appliances or equipment are to be installed. For use on 260/240/220/200-volt circuits, provides 125/115/105/95-volt output. Acme Electric Corp.

184—One Tool Holder that does the job of six is the new universal-positioning "Uni-Max." It holds any 3/16- to ½-in. tool bit or boring bar in any horizontal work position on lathes, planers, shapers, slotters, etc. Three sizes. Maxwell Industries, Inc.

185—Corridor Light is a one-piece fully framed plastic diffuser with particular use in narrow-area illumination. Diffuser is hinged on sides for rapid replacement of lamps. Two rapid-start models take single lamp or two 48-in. lamps. Fluorescent Fixtures of California.

186—Photoreader using any standard width perforated paper tape will photoelectrically read paper tape data into control and computer systems at rate of 1000 characters/sec. Reels hold 350- or 700-ft. tapes, containing 40,000 or 80,000 characters. Burroughs Corp.

Turn the page

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ALLIS-CHALMERS

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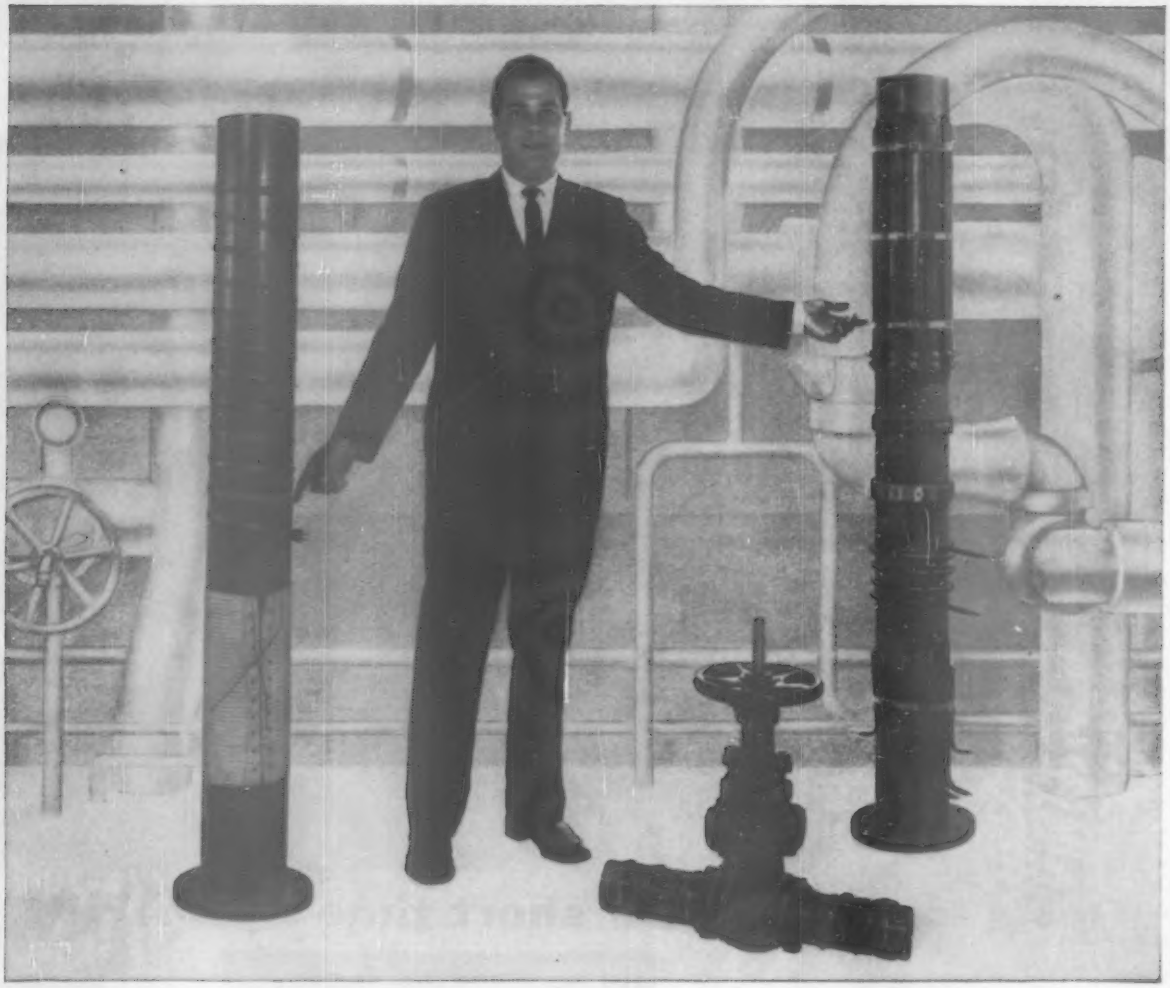
What's the best way to heat a pipe?



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Each of the above pipe heating methods has particular advantages. Your Chromalox Man can help you determine the one best electrical answer to your individual problem.

Maybe Chromalox Strip Heaters best meet your operating conditions. Quickly and easily installed at low initial cost, they provide uniform, accurate temperatures by either automatic or manual control. Lengths from 4″ to 96″ can be clamped in place side by side, or, half-round strip heaters may be bolted together to a minimum inside radius of 3½″. Sheath material and terminal placement vary according to your application.

Or perhaps Chromalox Tubular Heaters are the answer. These versatile heaters are available in straight lengths or bent to any shape you may require. Only Chromalox Tubular Heaters have the patented triangular cross-section that puts more heater area into surface contact for maximum heat transfer.

Still other pipe heating problems can be solved quite simply by one of several Chromalox "wrap-around" type heaters. Chromalox Pre-Fab woven electric heaters may be held in place by lacing, adhesives or snap-fasteners. Chromalox Thermwire Tape and Cable answer hundreds of other problems that can be solved by low temperature localized heat.

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3033

FACTORY / EQUIPMENT NEWS

Begins on page 118

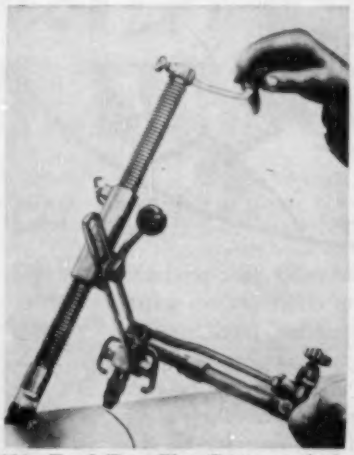
For more about these items, circle item numbers on Reader Service Card next to back cover.

187—Flow Check Snubber offers low-cost protection for valuable instruments and prevents the escape of noxious, toxic, and flammable gases and liquids when pressure instrument systems rupture. Device withstands pressure differentials to 30,000 psi. Chemiquip Co.

188—Corrugated Container, delivered flat and stored flat, opens like an accordian and is ready for packing and shipping in a jiffy. The bottom of "Jiffy Box" is pre-sealed to speed up packing. Comes in a variety of sizes and styles. Metro Corrugated Container Corp.

189—24-Volt Walkie-Stacker handles 2000-lb. palletized loads up to 48x48 in. and stacks them over 10 ft. high. Four 6-volt batteries, mounted two on each side of drive unit, provide this compact power unit that's only 25 in. longer than load length. Raymond Corp.

190—Safe-Load Relay makes it possible to stop an overloaded electric motor during critical peak or starting load period. Device responds instantly to momentary overloads—for applications from single-motor machine tools to multi-motor set-ups. Baker Perkins, Inc.



191—Torch-Type Pipe Cutter excels for jobs like cutting holes in intersecting pipes and tubes prior to welding joints. Six models can cut various shaped holes of 2¾- to 24-in. dia. Clean, sharp, swift burning action produces finished end cuts. Orbit Sales Co., Inc.

192—Automatic Petcock can replace a manual petcock on any model compressed air line filter, thus converting it to a drain which opens automatically when the air line is turned off between shifts or overnight. Maximum operating pressure is 400 psi. Wilkerson Corp.

Turn the page

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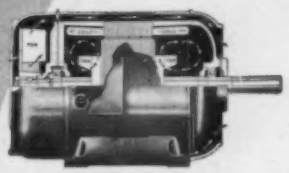

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This long horizontal Slat Conveyor aids mass production of power transformers. Winding machines flank both sides and coils are lifted onto conveyor by overhead crane. Movement is toward drying oven in rear where coils are upended automatically before entering oven.

GROWING competition for sales has produced among other benefits, an all-out effort to curb waste. Waste, whether measured in materials, labor, time or space, is a luxury that today's business can ill afford. Losses in these areas often can be reduced or even eliminated by more efficient materials handling—with a favorable effect on price and sales volume.

Logan Conveyors have been employed by successful companies for nearly a half century in solving materials handling problems. Logan's expert engineering staff is ready to help you, too.

For more information or an engineer's call write to—

LOGAN CO., 510 CABEL ST., LOUISVILLE 6, KY.

Logan Conveyors

FACTORY / EQUIPMENT NEWS

Begins on page 118

For more about these items, circle item numbers on Reader Service Card next to back cover.

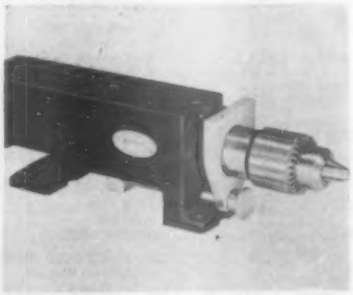
193—Electric Clip-Top Packer closes filled cartons electrically with king-size staples—also sets up empty boxes ready for packing. Unit staples A, B, or C flute corrugated board, drives up to 420 staples/min. Operates on a-c/d-c 110-120 volts. Container Stapling Corp.

194—Universal Lighting System, easily installed, supports as well as feeds the lighting fixtures. Fixtures may be positioned anywhere throughout the flexible 20-amp. system; twist-in plug receptacles permit adding outlets at any spot. Bull-Dog Electric Products Co.

195—Large Parts Totebox, made of lightweight glass fiber and polyester resin, measures 26x21x12 in. Molded hand holes permit easy handling; corner lugs and notched bottoms allow easy, balanced stacking. Various colors available. Molded Fiber Glass Tray Co.

196—Electric Towing Tractor is an explosion-proof model, built for safe operation amidst explosive vapors and fumes (as in paint and chemical plants). Wiring is contained in armored circuit. Battery, electric switches, motors, junctions are all sealed. Moto-Truc Co.

197—Distribution Clamps for distribution size conductors of copper, aluminum, and ACSR, are said to greatly reduce galvanic corrosion because of design based on mass anode principle. Available with factory-applied no-melt inhibitor compound. Reliable Electric Co.



198—Drill Head, slightly larger than a carton of cigarettes, is priced under $100 for basic unit (less pulley and chuck). It will drill, tap, ream, spot face, countersink and counterbore—for varied machining work in light-gage steel, wood, plastics. The Bellows Co.

* * *

CORRECTION: We regret a two-photo mix-up on p. 148 of July Equipment News. Photos were switched of pallet-stacking frame made by Tier-Rack Corp. (Item No. 168) and hydraulic elevator made by Field Engineering Products Co. (Item No. 170).

A coating in COLORS that really sticks to new Galvanized, Aluminum and Terne Plate

RUST-OLEUM®
GALVINOLEUM® COATINGS

Remember? If you didn't go over every square inch of new galvanized metal with a chemical solution before painting . . . chances are that the paint "peeled off" leaving you with a costly eye-sore!

The development of Galvinoleum Coatings by Rust-Oleum changes all this! *Now* . . . you simply brush Galvinoleum right over brand new or unpainted Galvanized, Aluminum, or Terne Plate . . . no etching . . . no weathering . . . and it *lasts and lasts!* No "peeling" worries, no costly "headaches"... you have your choice of Red, Gray, Green, and Metallic! And you can use Rust-Oleum 575 Outside White, or any high-quality oil base house paint, over the Galvinoleum to match trim.

Pioneered, developed and field-tested by the Rust-Oleum Corporation — you have the assurance of a *brand name* backed by over thirty-five years of proved performance throughout industry. Try Galvinoleum... write for your illustrated Galvinoleum booklet with color charts.

RUST-OLEUM®
STOPS RUST!®

Rust-Oleum, Galvinoleum, and Stops Rust are brand names and registered trademarks of the Rust-Oleum Corporation.

Prompt delivery from Industrial Distributor Stocks.

Rust-Oleum is distinctive as your own fingerprint. Accept no substitute.

ATTACH COUPON TO YOUR LETTERHEAD—MAIL TODAY!

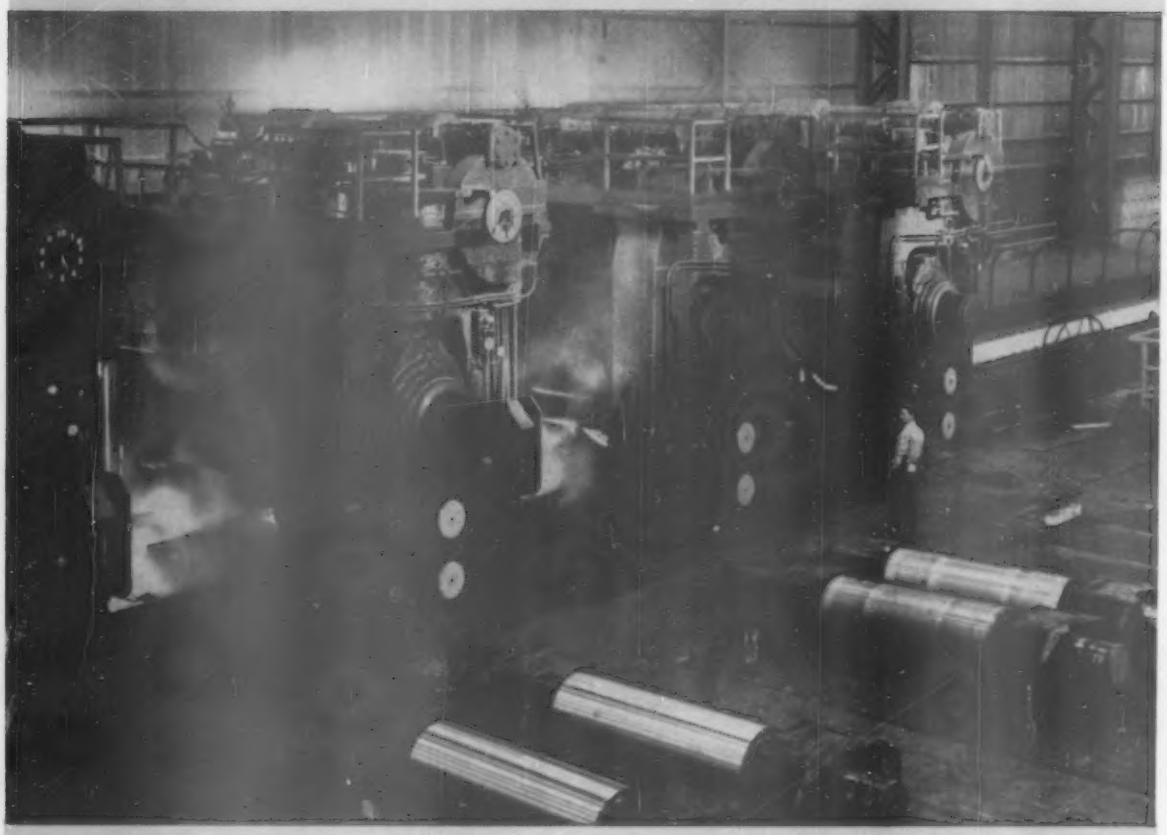
Rust-Oleum Corporation
2... Oakton Street • Evanston, Illinois

☐ Complete Rust-Oleum Galvinoleum Literature With Color Charts.

☐ Free Test Sample:
☐ Red ☐ Gray ☐ Green ☐ Metallic

☐ Nearest Source of Supply.

BOWER ROLLER BEARINGS



2 Bower exclusives give you 2 big advantages

Hundreds of America's leading manufacturers of machine tools and other production machinery use Bower tapered and straight roller bearings as original equipment. They know they can depend on Bower bearings for peak performance... and they recognize the advantages of these two exclusive design features:

❶ Spher-O-Honed—no run-in... Roller heads are ground to operating contour that other bearings must acquire through run-in. This means they hold adjustment, give smoother performance over a longer life.

❷ Higher Flange Design cuts wear... provides large, two-zone contact for roller heads. This exclusive design reduces pressure on individual rollers, improves roller alignment, cuts down wear and resultant end-play. Oil groove is larger, affording positive and constant lubrication of the roller heads, reducing heat and wear. Again this means longer life.

For the long life and low maintenance that mean dollars and cents in the plant, insist on Bower roller bearings for all your replacement needs.

BOWER ROLLER BEARINGS

FEDERAL-MOGUL SERVICE

DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC.

Costly 20-gallon-per-minute water leak stopped

BEFORE

AFTER

Waterplug stops running water instantly

Here is what Underwater Services, Valley Station, Ky., had to say about Waterplug

STANDARD DRY WALL PRODUCTS CO.
Box X
New Eagle, Penna.
Gentlemen:
On October 6, 1957, our Underwater Services Company was called upon to repair a major break in an underwater drainage system for the Hardin County Sportsmen's Lake at Elizabethtown, Kentucky. Upon diving to the bottom of the lake we discovered several large ruptures in the 24" tiles used in the drainage system. Water, uncontrolled, was pouring through these breaks at a minimum approximate rate of 20 gallons per minute. Using underwater diving equipment we managed to reduce this torrent by packing sandbags into the holes channeled through the four feet of earth covering these tiles. Descending through a water control tower, we gained access to the interior of the drainage tiles to the area of breakthrough. Above us were four feet of lake bottom and 20 feet of water above that. Under these extremely adverse conditions we used the Thoro System WATERPLUG Cement to repair the breaks from the interior of the tiles.
Because of the simplicity and ease of mixing and applying WATERPLUG Cement, we were able to completely and effectively repair these breaks in the drainage system.
We were delighted with the effectiveness of WATERPLUG Cement in successfully overcoming this difficult water problem. Feel confident that in future underwater repair problems, our company will rely upon WATERPLUG Cement.
Very truly yours,
MICHAEL CALE,
Manager.

WRITE FOR BROCHURE "HOW TO DO IT"

STANDARD DRY WALL PRODUCTS, INC.
NEW EAGLE, PA. • CENTERVILLE, IND.

circle 555 on Reader Service Card

Send a TRUCKSTER instead of a Truck!

Cushman 780 TRUCKSTER.

Here's the machine, already proven in hundreds of factories, that can cut your intra-plant and inter-plant light hauling costs to a bare minimum.

Ruggedly built and driven by the powerful Cushman Husky engine, the Cushman 780 Truckster handles an 800 pound payload with ease. It not only operates at a cost of less than a penny per mile, but requires a minimum of maintenance expense.

The 780 Truckster can save man-hours, too, by converting a "walking" supervisory job into a "riding" job. And it can be used to carry personnel. Highly maneuverable, it requires only a 50-inch passageway.

The 780 Truckster is available with fiber glass cab and side curtains as optional equipment, and in a wide variety of body styles to fit your specific needs. Electric starter also available.

CUSHMAN MODEL 731 ELECTRIC TRUCKSTER

A two-passenger machine with quarter-ton payload capacity. Operates silently and efficiently at a cost of pennies per day. Goes anywhere—inter-plant or intra-plant; requires only a 40-inch passageway.

Ask your dealer for a FREE demonstration or write for new booklet

SOLD AND SERVICED NATIONALLY
Replacement parts immediately available

CUSHMAN MOTOR WORKS, INC.
A subsidiary of Outboard Marine Corporation
958 No. 21st, Lincoln, Nebr.
Please send complete information on 780 Truckster

NAME_____
ADDRESS_____
CITY_____ STATE_____

For more facts circle 556 on Reader Service Card

Where a misstep costs $500... Blaw-Knox Electroforged® Steel Grating provides safer non-slip footing

Stair falls cost industry over $60,000,000 a year.

An average accident amounts to a loss of $500 in claims.*

A good way to guard against these profit-eating accidents is to construct your stair treads, walkways and floors with Blaw-Knox Electroforged Steel Grating. Non-slip twisted crossbars and a wide variety of bearing bars are available to meet every kind of working condition—safely solving the most hazardous skid situations.

Rigid, one-piece construction makes installation easy. Once on the job, Blaw-Knox grating practically takes care of itself. There is nothing to wear, nothing to patch, no dirt collecting corners to clean. It goes anywhere, fitting neatly around pipes, beams and machinery, admitting plenty of light and air to the area.

Made to your specifications, Blaw-Knox grating provides new highs in safety, easy up-keep and flexible application. For new ideas about grating—including space saving platforms and shelving, write for Bulletin 2486.

*Based on a study analyzing 803 compensable work injury claims closed in Illinois involving stairs and steps.

BLAW-KNOX

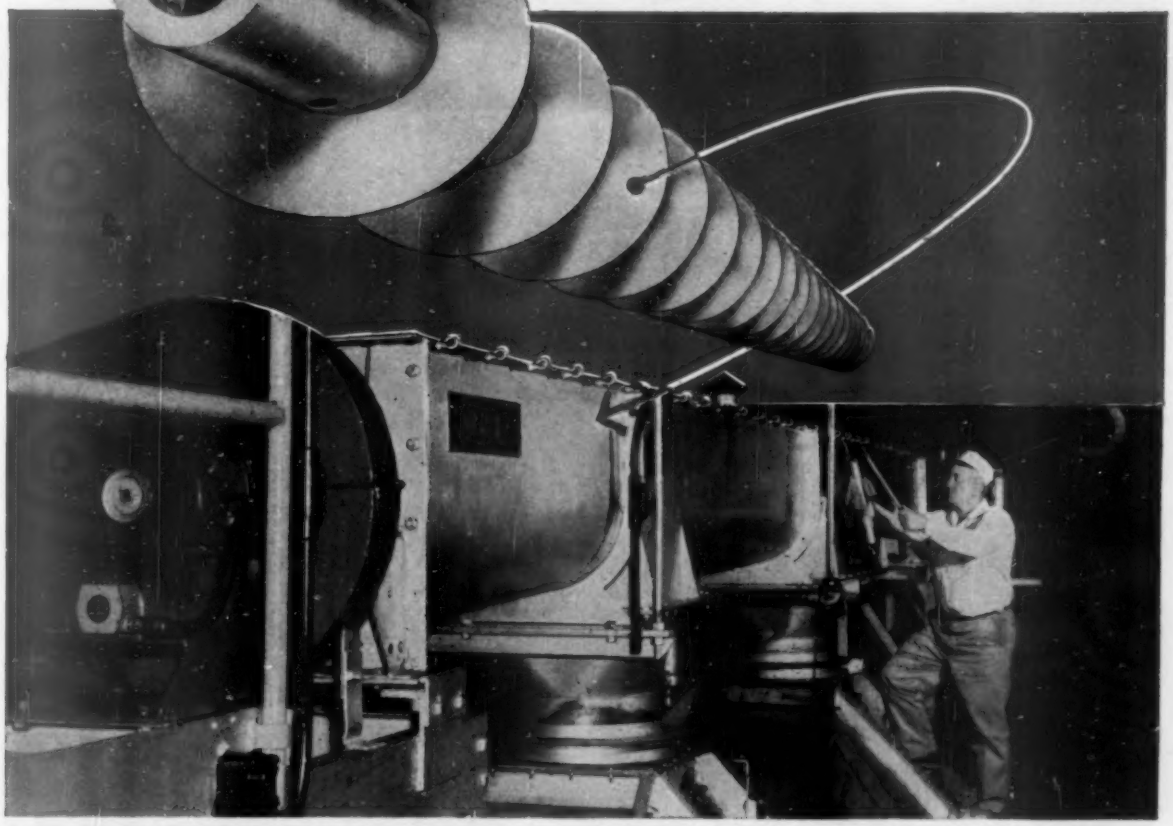
BLAW-KNOX COMPANY

Equipment Division
Dept. B, Pittsburgh 38, Pennsylvania

Here's why a Link-Belt engineered screw conveyor installation means

a better-working system ...less work for you

- Thorough engineering analysis of all conditions
- Unbiased selection from industry's most complete range of components
- Expert field erection
- Full responsibility for satisfactory performance



FROM design of equipment to operation, you leave nothing to chance when you leave everything to Link-Belt's complete screw conveyor service. Whatever your needs, Link-Belt can engineer a system to meet them exactly . . . if desired, will handle entire erection and accept full responsibility for placing your system in operation.

Included in Link-Belt's full line of components are 17 basic screw designs, available in a variety of metals. Each offers Link-Belt's exclusive Quik-Link feature that permits fast, easy removal of any conveyor screw section or hanger without disturbing other components. An equally complete line of troughs, ball and babbitted bearing hangers, trough ends with ball bearing flange blocks and trough end seals, couplings, gates, spouts, and drives makes Link-Belt your convenient, one-source supplier for all your requirements. Ask your nearest Link-Belt office for Data Book 2289.

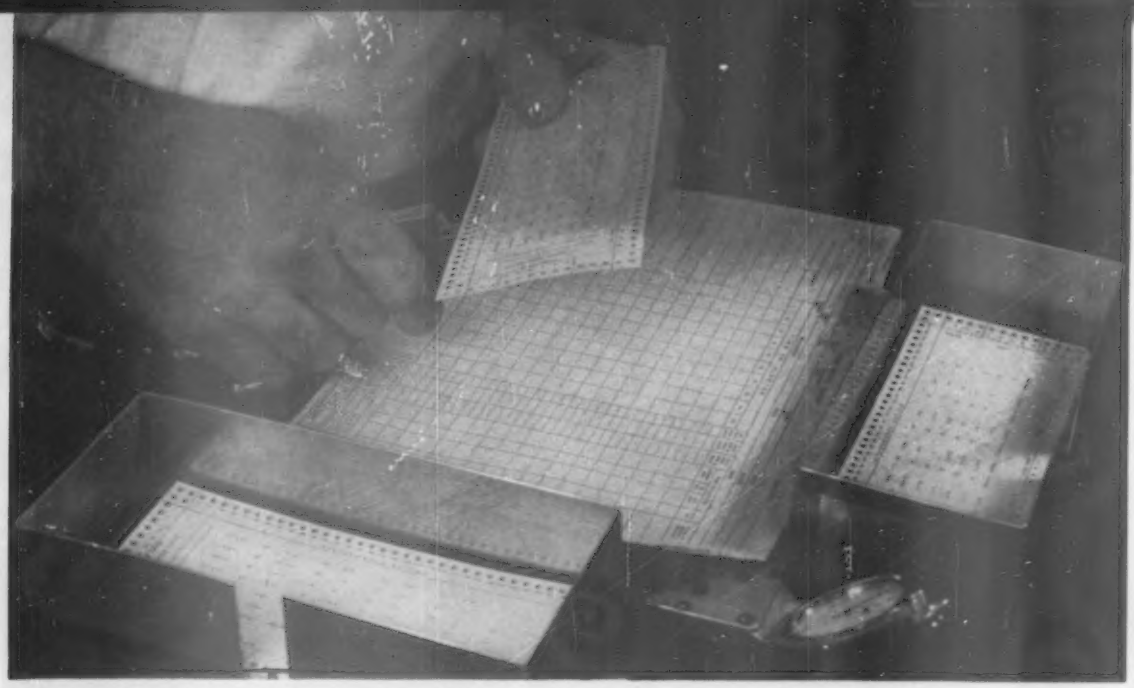
LINK-BELT

14,707

SCREW CONVEYOR EQUIPMENT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

For more facts circle 558 on Reader Service Card



WITH EASY-TO-USE TRAY OBSERVER RECORDS WORK-SAMPLING DATA ON SPECIAL CARDS.

Now—Easy Way to Sample Work

You'll breeze through data collection and analysis with this brand-new system. It will steer you clear of errors, save time, give facts you can depend on.

A BREAKTHROUGH is the way we describe today's work-sampling technique here at Johns-Manville. Our new system (we developed it ourselves) revolutionizes data collection and data analysis. It substitutes ease, speed, accuracy, and economy for the drudgery, error, and cost that marked our former systems.

Secret of our new method: We adapted to our own needs a commercial proprietary system for recording and analyzing data (photo above, punched card opposite). And we adapted our own terminology and techniques in such a way that this proprietary system could record our data accurately, speed analysis.

Obstacles spotted — Like other plant management groups, we're sold on work sampling as a fact-finding technique. We've used it for a long time for such jobs as setting incentive standards for indirect work. And like plant managers elsewhere we know the merits of work sampling—see it as an indispensable and universally useful tool.

But soon after we started into work sampling some years ago, we saw we shared some problems that plagued other companies. We began with a manual method of gathering data ("How You Can Put Work Sampling to Work," FACTORY, July 1952), writing and scoring observations on a custom-designed form and tabulating by manual addition and calculation. This was burdensome, slow and subject to many errors.

Our first advance was to use mark-sensitive tabulating-machine cards, with an electrographic pencil to record observations and tabulating machines to coordinate the data from marks on the cards. This system completed a study in about half the time our original system took. But it was inconvenient for our smaller plants unless they had their own tabulating equipment. What's more, without great care in marking cards, tabulating errors crept in.

Obstacles knocked over—Our latest advance, the system we're using today, is tailored in detail to Johns-Manville's needs. In principle it's adaptable to the peculiar needs of nearly any kind or size of plant where work sampling plays a role. It's our own adaptation of the Keysort system (The McBee Company, Athens, Ohio).

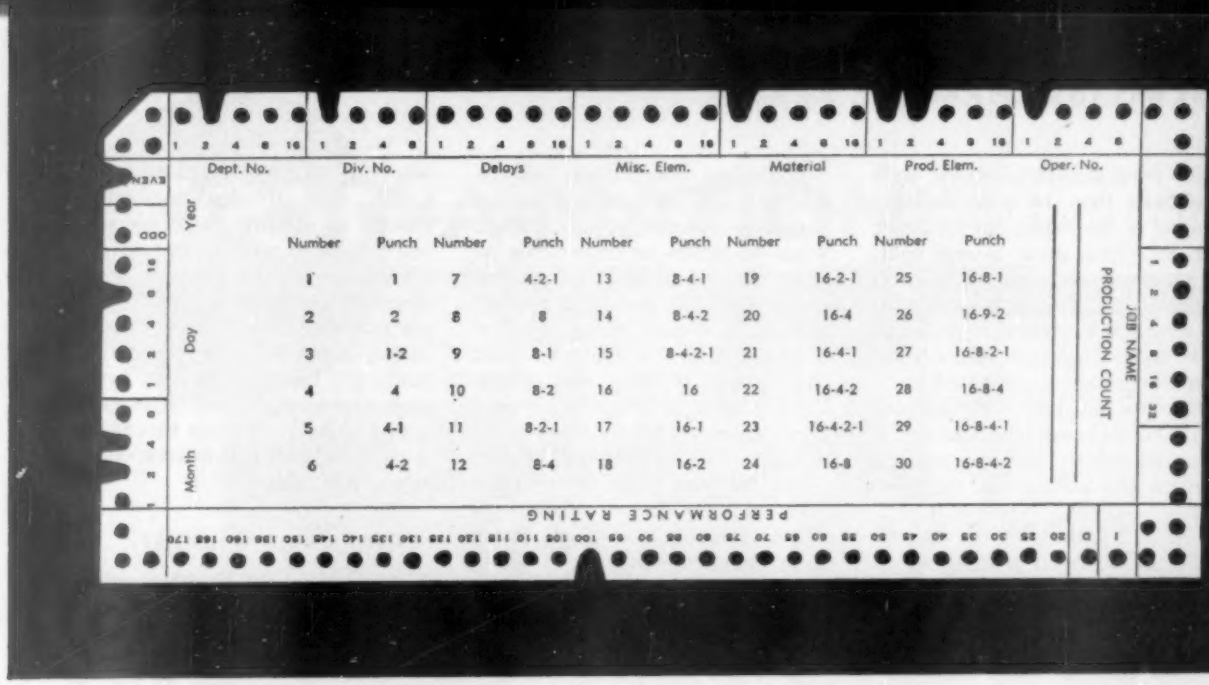
By ROBERT N. PAGE
Supervisor of Industrial Engineering
Johns-Manville, Zelienople, Pa.

RECORDING MADE SURE

Here's how we record observation data in work sampling:

First steps, common to all sampling systems (including ours), are to define the problem, to plan and organize the study, and to break the job into its elements.

Difference begins—Here's where we take our departure from conventional systems. We list and assign a number to every element of the job, every material that may be handled when the operator is per-


Dept. No.
Div. No.
Delays
Misc. Elem.
Material
Prod. Elem.
Oper. No.
Year
Day
Month
Number Punch Number Punch Number Punch Number Punch Number Punch
1 1 7 4-2-1 13 8-4-1 19 16-2-1 25 16-8-1
2 2 8 8 14 8-4-2 20 16-4 26 16-9-2
3 1-2 9 8-1 15 8-4-2-1 21 16-4-1 27 16-8-2-1
4 4 10 8-2 16 16 22 16-4-2 28 16-8-4
5 4-1 11 8-2-1 17 16-1 23 16-4-2-1 29 16-8-4-1
6 4-2 12 8-4 18 16-2 24 16-8 30 16-8-4-2
PERFORMANCE RATING
PRODUCTION COUNT
JOB NAME

SPECIALLY ADAPTED CARD MAKES DATA ANALYSIS EASY, SWIFT, ACCURATE.

and Sure Way to Use Your Data

forming the elements, and every reason for unavoidable delays.

For example, take our breakdown for the job of cement shipping at our Waukegan (Ill.) plant. It goes like this (some elements omitted):

Production elements. 1. Load to railroad car . . . 3. Load material . . . 4. Truck material to storage . . . 8. Load trailers . . . etc.

Miscellaneous elements. 1. Clean up No. 109 . . . 3. Set up and finish car . . . 4. Brace car . . . etc.

Materials. 1. Bags . . . 2. Cartons . . . 4. Drums . . . etc.

Delays. 1. Service truck . . . 3. Take instruction from foreman . . . 6. Get bracing material . . . etc.

These lists and numbers become the coding key for our tailor-made Keysort cards.

Now, the observations—We record these on our adapted Keysort cards (shown above). The cards measure about 7½x3 inches, have five holes per inch around the outer edges. We buy them blank from McBee, then have them printed our own way. This way, we don't have to design a form or card before we begin a study, save time that's usually spent getting ready to observe an operation.

Basic card design is our own. It enables us to record a wide range of data. In the fields across the top we can record all information that's in code form—productive elements, miscellaneous elements, materials. On the bottom we can record performance rating given to each observation, together with delay and idle indications. On the left end of the card we punch in the date of the observation; on the right end, our production count, which we need to relate production and time. The cards are designed so we can record production information as well as observations without changing the codes on the card.

By the numbers—To record an observation in any of the fields on the card we punch the combination of numbers printed on the card that will give us the code number we want. For instance, if we want to punch Code No. 8 ("Load Trailers") into the productive-elements field of the card, we merely punch out Hole 8. But if we want to punch Code No. 11, we punch out Holes 8, 2, and 1 for a total of 11.

With our numbering system only one combination of card numbers will add up to any specific code number we want. In other words, there's only one way of punching any given code number. That's one guard against error. Another guard: On the card we print the correct number combinations that will give our observers the code numbers (from 1 to 30) they want to punch.

The numerical coding system on the card—the 1, 2, 4, and 8 numbers printed in the fields—is unique as far as we know. It enables us to record up to 15 code numbers in a field, then double the possible code numbers by adding only one more hole and assigning it a number that's twice as high as the last number.

Turn the page

FREE FILE COPY of this article available while the supply lasts. Circle FC-11 on Reader Service Card next to back cover. For complete FC list, see page 204.

For most studies we know we'll need more than 14 code numbers in some of the fields, but far fewer than 99. Thus most of our fields are set up so we can record 31 codes in each field. To do this with the conventional Keysort card we would have needed a larger card—would have had excess capacity on it.

Out on the floor—We use one card to record each observation. The observer records the operator, the element he's performing, the material he's handling, and the rate at which he's working. If the operator is idled or delayed at the time, the observer records that fact. To record an "Idle" observation the observer makes only one punch—the "I" in the lower right-hand corner of the card. To record an observed delay he punches "D" on the card, then punches the reason for the delay at the top of the card. We require performance ratings only for observations on productive or miscellaneous elements.

Recording observations on the floor is easy. The observer carries a supply of cards in one pocket. When he makes an observation he pulls a card from that pocket, punches it, and puts it in another pocket. (It doesn't hurt to bend or wrinkle the cards a little.) To make observation recording even easier, we've rigged a specially designed tray (photo p. 178) for blank cards, punched cards, stopwatch, pencil.

Off the floor—The observer can wait until the end of the day to punch such data as date and department number. Not only that—he can also punch this information into several cards at once.

Production counts for each day also can be recorded on our cards at the end of the day. We can recap each day of the study as we go along and thus find out when we've got enough observations. We punch into the "Job Name" field the job to which a production count belongs, then punch the amount of production (say, 500) into the "Production Count" field. If what's written is enough to identify the production units, we need no more punches. If it's not enough (for instance, if the observer has punched "500" without punching "Bags"), then we have to put a punch in the "Material" field. We find this method better than writing production on separate sheets of paper, because we can file each count with the observations to which it is related.

ANALYSIS MADE RIGHT

To recap a day's observations (next step in our system) we first sort the cards by elements and delay reasons. We do this with sorting needles — plain No. 0 knitting needles that cost about 10¢ apiece.

Sorting procedure—It's like that of almost any other Keysort system. The one big difference: With the type of coding we have (1, 2, 4, 8 numbers) it's better to work from

HAGAN COAGULANT AIDS SOLVE COLOR PROBLEM FOR WOOLEN MILL

Slurry-Feeding Hagan Coagulant Aid No. 18 at J. J. O'Donnell Woolens, Inc.

J. J. O'Donnell Woolens, Inc. produce cashmere and high quality ladies woolen goods, specializing in pastel shades. Located downstream of a steel mill, a sewage plant and several other woolen mills, the periodic high organic color and detergent content of Blackstone River water created a difficult clarification problem. Even with heavily increased alum dosages, color removal was poor, frequently necessitating reprocessing.

Over two years ago, the plant adopted the use of Hagan Coagulant Aid No. 18 during periods of high color. Alum dosage has been reduced by 25%, with good floc formation and sedimentation. Color removal is now excellent.

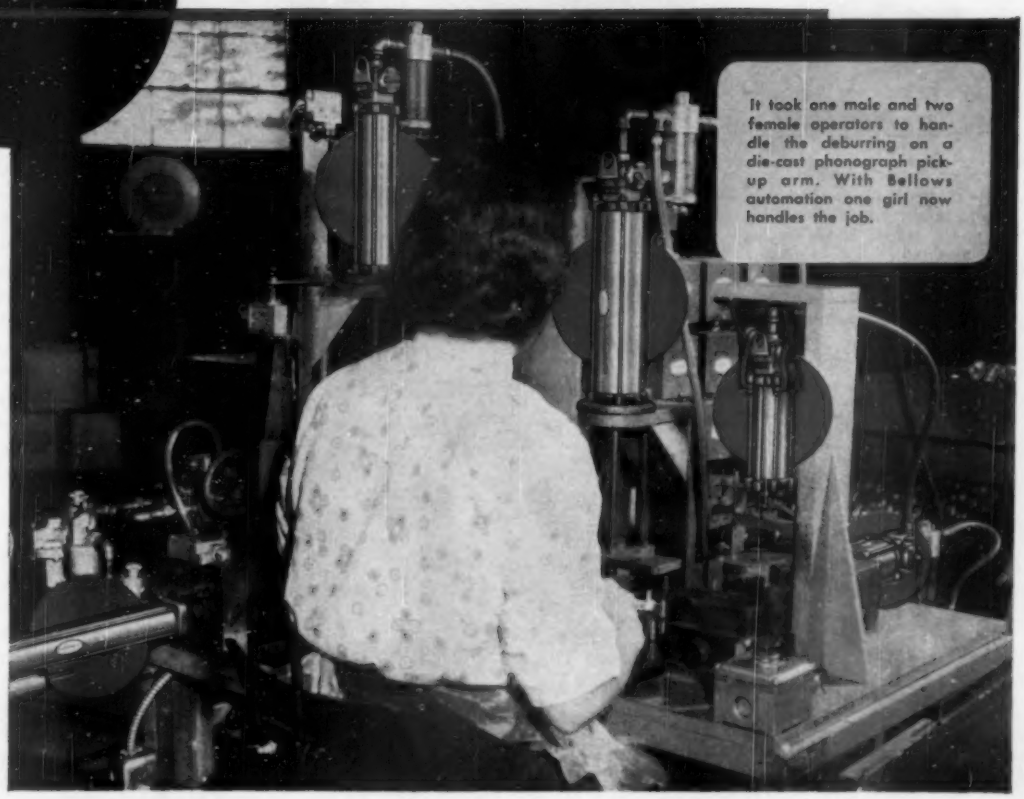
Hagan Coagulant Aids are non-toxic, easy to handle, and produce a large tough floc that speeds settling time and reduces carryover.

Hagan Aids may be dry-fed or slurry fed as desired. Write for Bulletin 410-12-2 for information on the complete line of Hagan Coagulant Aids.

CALGON COMPANY

DIVISION OF HAGAN CHEMICALS & CONTROLS, INC.
HAGAN BUILDING, PITTSBURGH 30, PENNSYLVANIA
DIVISIONS: CALGON COMPANY, HALL LABORATORIES
IN CANADA: HAGAN CORPORATION (CANADA) LIMITED, TORONTO

"SPOT-A-MATION"


It took one male and two female operators to handle the deburring on a die-cast phonograph pick-up arm. With Bellows automation one girl now handles the job.

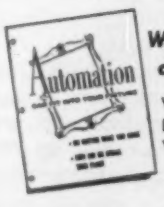
...a fast way to important cost savings

Any plant, no matter how large, consists of many "small plants" or separate manufacturing centers. Sometimes these separate manufacturing centers consist of no more than a single operation; sometimes they embrace a group of related operations.

A quick approach to important cost savings can be to "spot automate" these separate "small plants" with Bellows Controlled-Air-Power Devices.

These packaged work units can be quickly incorporated into existing equipment to make it fully automatic; can be used to interlock or program a number of machines or operations; or can form the key components in low-cost, tool room-built, special purpose machines.

A Bellows Field Engineer (there is one or more in every major industrial area in the United States and Canada) will be glad to discuss with you the ways you can use to "spot automate" your plant. No obligation, of course. Phone him (he's in the book under "The Bellows Co.") or write to us in Akron.



Would you like a copy of this booklet?

Write Dept. FA958. Ask for the booklet—"Automation can fit into Your Picture."

The Bellows Co.

DIVISION INTERNATIONAL BASIC ECONOMY CORPORATION

AKRON 9, OHIO

1126-B

TURCO Gets a Better, More Uniform Finish

And Cuts Paint Cost 35% with—

RANSBURG

NO. 2 PROCESS

Frequent color changes are simplified now in the painting of playground equipment with Ransburg Electro-Spray in this St. Louis plant. Long, tubular parts, as well as these smaller pieces, are uniformly coated with the Ransburg reciprocating disk.

QUALITY IMPROVEMENT! That was Turco Manufacturing's chief reason for changing from flo-coat to electrostatic spray painting of their quality line of playground equipment.

Not only is Ransburg No. 2 Process providing a higher quality, uniform coating on all parts, but Turco is saving 35% in paint cost!

Simplicity in color change with Electro-Spray is another important advantage here. With Turco's production methods, colors are changed 15 times in an 8-hour shift. Now, changes are made on the fly with no down-time. By contrast, the former "stop and go" method would mean over an hour's lost time in a day's operation.

NO REASON WHY YOU CAN'T DO IT TOO!

Whatever your product, if it's painted, we'd like to tell you more about the worthwhile savings and benefits which can be yours with RANSBURG ELECTROSTATIC PAINTING PROCESSES. Write for our No. 2 Process brochure which cites many examples of electrostatic spray painting on a wide variety of products.

Call or write

RANSBURG
Electro-Coating Corp.
3939 West 56th St., Indianapolis 23, Ind.

EASY WAY TO SAMPLE WORK

Begins on page 178

highest to lowest. For example, if our card shows nine productive elements, we pull out the observations on Element 9 first, then Element 8, and so on. If we pulled out the observations on Element 1 first, our needle would pick up not only the observations for Element 1 but also all those that had the numeral 1 on their code-number combination.

Analysis started — After everything is sorted we set up one spread sheet for each type of element (productive, miscellaneous, or delay). We use these sheets to keep track daily of the per cent occurrences of each element and the productive or normal hours that have been spent on that element.

This information we get from the cards—first by counting the cards we sorted out for each element, then by posting the total number of observations for each element to its respective spread sheet. By dividing this number on each element by the total number of observations taken that day, we get the per cent (P) occurrence of the elements. Then we go back to the cards and determine the average rating for each element. If there are lots of cards we can do this, too, by Keysorting. If there are only a few, it's easier to add the ratings and divide to get the average.

With this rating figure we can calculate productive hours for each element by a simple formula:

$$\text{Normal obser.} \times \frac{\text{Actual hours}}{\text{Actual obser.}} = \text{Productive hours}$$

The spread sheets show us each day how the study is progressing. And our per cent occurrences give us a pretty good idea of how long we'll have to make observations.

Standard hours found—Final step is to relate production and time to obtain standard hours per unit. Here again we depart from the standard Keysort system.

Instead of relating the production count on a certain job to the total time of the group of elements making up that job, we relate production and time on an element basis. That is, we relate the normal time of each element to the production turned out in that time, thus come up with a standard time per unit for that

Good box imprinting saves money, speeds handling, helps build sales

it can for you

Readable, attractive imprints on your boxes – telling the product's size, color, part number or other characteristic – work for you from the time of printing until your product reaches the user. This kind of marking – done by a Markem Method in hundreds of plants – provides important advantages and savings unobtainable with hand stamping or buying pre-printed boxes from outside sources. *Here's why:*

With a Markem Method complete identification is machine-printed on boxes *as you need them*, in the correct quantity. Production is not held up by outside delays or slow hand stamping; all operations are done within *your* plant. As imprint requirements change, Markem type or printing elements can be changed in seconds. Box inventory is smaller – easier to coordinate with changing demand.

Clear, lasting imprints reduce waste and packing errors. They help dealers and retailers process and sell your products efficiently . . . simplify and encourage reordering . . . add sales appeal and assure quick shelf identification.

The best Markem Method for your boxes – whether set up or in flat, big or little, smooth or rough surfaced – is based on the right combination of Markem machine, type and specialty ink for your needs. The machine can operate in your production line or anywhere in your plant. One machine can also be used for marking boxes, labels and flat parts. Thousands of Markem specialty inks answer virtually any requirement in surface, material, color, drying speed or special characteristic.

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On a calculation sheet we post time and production information from spread sheets, observation cards, and production cards. Then we calculate the standards. We set up one sheet for each element. When the element covers several types of material we also set up one sheet for each material and break down the total time of the element into the different amounts that were spent on each material.

For instance, we would use calculation sheets this way for the loading element (Productive Element 3) on the sample card (p. 179). To find correct productive hours corresponding to the bagged material that's specified in the description, we would have to go back to the cards—rather than pick the time directly off the spread sheet. We would separate the cards for this element by material and recalculate the productive hours for each material. Then we would post the hours pertaining only to the bags to the worksheet, divide the productive hours by the production count, and thus get normal hours per bag.

You'll get more help . . .

. . . on work sampling in the following articles in your back issues of FACTORY. Reprints of some (noted below) are available from Reader Service Department, Factory, 330 W. 42nd St., New York 36. Order by code number.

"How You Can Put Work Sampling to Work," July 1952. (Reprints available. 50¢ each. Code No. R-1.)

"Work Sampling Without Formulas," March 1954. (Reprints available. 35¢ each. Code No. R-2.)

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FACTORY
MANAGEMENT AND MAINTENANCE

LABOR RELATIONS NEWS

By PAUL A. KING, Attorney, Bigelow-Sanford Carpet Company, Inc., Member, New York Bar

New Rules for Plain Talk on Hot Issues

Here's some help in understanding the critical but tangible subject of management-union-employee communication—your rights and limitations.

At the start of almost every union contract there is sweet language declaring the intent of company and union to get along with each other and to cooperate for the company's good. The words vary from contract to contract but the idea is about the same. Most employers pay little attention to these paragraphs. They pass on to more important things. But this clause became important to the Cullman Lingerie Corporation.

This Alabama company passed out a pamphlet to employees called "Our Right To Work." Thought it might be good propaganda in the fight against the repeal of Alabama's right-to-work law. The pamphlet was prepared by Associated Industries of Alabama and, of course, strongly presented the employer's view. There were phrases about "labor bosses" having an absolute dictatorship over their members. It talked about the "booty" grabbed by union officials, and so on.

The union complained bitterly. Took it as a personal attack. Said it violated the contract clause which provided that the union and the company agreed "to do everything possible to eliminate needless controversies and to promote economic and industrial harmony between the parties."

This was not an attack on this union, ruled arbitrator William M. Hepburn to whom the problem was taken. If it were, then the contract would have been violated. But it wasn't.

But the company shouldn't have done it anyway, the arbitrator said. It should have known that distribution of this booklet would disrupt employee relations. So the arbitrator put an unusual stipulation in his decision. He ordered the company to post his award in the plant to show employees that the company was not attempting to undermine the union.

Some companies have a standing rule against union solicitation on plant property. Can't pass out union literature either. Will such rules stand up if the company itself hands out anti-union material and propaganda to its employees?

It depends upon the facts of the case, the U. S. Supreme Court recently ruled. What facts? The court wasn't very explicit, but it did say:

- The union can't solicit or pass out organization material unless it first asks the company for an exception to the rule.
- The courts must decide whether the rule will prevent the union from getting its tale to the workers. That the employer uses a method of getting a message to employees is in itself no reason why the same method must be made available to the union, said the court.

Up until now this was the situation:

- The U.S. Supreme Court had said that employers, as a rule, cannot disapprove union solicitation during non-work hours.
- But employers can make solicitation taboo during working time.
- Non-employee union organizers can be kept out of the plant any time if other means of reaching employees is reasonably available, and if the no-solicitation rule is uniformly followed.

But note that an important consideration before the U.S. Supreme Court in its rulings on company and union propaganda was whether or not company enforcement of anti-solicitation and distribution rules is an unfair labor practice when the company itself is violating its own rules.

Is Strike Notice Required?

There's a section of the Labor-Management Relations Act that attempts to maintain the sanctity of the union contract—prevent hasty strikes. But the United Mine Workers of America found a loophole that the National Labor Relations Board promptly plugged up. And a U. S. Court of Appeals just as promptly unplugged it.

The LMRA forbids a strike or lockout for 60 days after notice to terminate or modify the contract has been given. Object: to provide the parties with a calm, cool, and collected collective bargaining period in which to settle the matter. This provision does not apply, however, where the attempt is not to change the terms of the existing agreement but to get something not embodied in the contract.

The national coal industry union contract provided that, in two or three shift operations, the question of seniority in respect to the various shifts is to be left to the discretion of the contracting parties at the mine in question. A seniority question came up at a mine of the Westmoreland Coal Company in West Virginia and was answered by an impartial umpire. The union didn't care for his answer. It struck.

The NLRB ruled that the union had engaged in an unfair labor practice. The strike was for the purpose of modifying an agreement. And 60-day notice should have been given. In support of its ruling the Board reasoned that the umpire's decision became part of the contract as if written in the agreement. The U. S. Court

No more drudgery for me in cleaning grease-caked floors

A flip of the switch re-sharpens brushes automatically!

His boss is happy too . . .

and should be. Now an Industrial Dry-Scrubber, Finnell's 84XR at left, does the job in about one-tenth the man-hour time required to hand-scrape the floors! And of course the machine is far more thorough, and spares maintenance men the back-breaking effort of manual methods. Equipped with two powerful scarifying brushes, the *84XR* digs through and quickly loosens even the most stubborn coatings of dirt, oil, grease, and shavings. Universal couplings enable the brushes to clean recessed areas that rigid coupling brushes would pass over and miss.

Reversible motor keeps wires sharp. *A flip of the switch* reverses the rotation of the brushes and re-sharpens them automatically . . . *while working!* Eliminates the need for frequent changing of brushes by hand in order to maintain a sharp cutting edge. Reversal of brush rotation also helps keep the brushes functioning efficiently by ejecting sticky substances that would otherwise clog and slow up the cleaning process. Total brush spread of the *84XR* is 22 inches. Low, compact design permits cleaning right up to and beneath machinery — areas where deposits are heaviest. Interchangeable rings and brushes adapt the machine to wet-scrubbing, polishing, and steel-wooling.

Clean floors allow industrial trucks to move swiftly, surely and, according to actual tests, with *half the pull* it takes to move loads over dirty floors. In addition, clean floors aid safety underfoot and contribute to worker productivity. So it pays to keep floors clean — especially with a labor-saving *84XR!* (The Vacuum Cleaner at extreme left, *Finnell's 10C,* features a 1½ hp, 115v AC-DC By-Pass Motor. Tank capacity: *Wet,* 12 gallons . . . *Dry,* 1¼ bushels.)

For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2509 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

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Begins on page 186

didn't see it this way. It reasoned that the question of seniority was not provided for in the contract. It was up to the parties to reach agreement. The strike was not for a modification of the contract. Its purpose was to get what the contract said they were entitled to get, namely, a settlement of the seniority question. The 60-day provision didn't apply, the court concluded.

One of the judges, in a strong dissenting opinion, pointed out that the "total" collective bargaining agreement was the master contract plus what the parties agreed to do locally. And in this case the parties left the decision as to what to do locally up to an arbitrator. A strike against the arbitrator's decision is a strike against the provisions of the contract that make such a decision binding.

Managers' Pensions Improved

Personnel men and others having responsibility for the management of company pensions certainly are familiar with the general rule that a pension plan must not discriminate in favor of higher paid employees if it is to receive the tax benefits of a qualified plan. This is generally true, but the Treasury Department has approved a pension plan installed by the Western Union Telegraph Company for salaried employees earning more than $7500 a year. This plan is on top of a basic plan that is applicable to all employees regardless of salary. So it can be done!

Western Union said: We want "to make our middle and upper-level management jobs more attractive both to present incumbents and to future candidates."

Aptitude Tests Upheld

Arbitrator Alexander H. Frey announced to a disappointed union that aptitude tests are here to stay and employees had better adjust to the idea. This was his response to the union's contention that aptitude testing works a hardship on unlearned employees. The union felt that test results are often unfairly warped by the employee's experience with and approach to them.

Of 19 employees of the Atlas Powder Company who bid on a warehouseman's job, nine with the most seniority were selected for aptitude testing. Atlas reviewed the education and experience of those taking the tests and their test scores—and gave the job to the employee with the highest score. As it happened he had the lowest seniority.

There would have been no complaint had there not been a union and a contract clause on the subject. The clause read, in effect, that seniority was to control when aptitude, fitness, skill, and ability of employees are relatively equal. In the union's book, this meant that the most senior employee should get the job—unless he was obviously not qualified for it. Not so, said Arbitrator Frey.

Here's the right way to handle a situation of this kind, Frey recommended. First, line up the qualifica-

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NEW from Standard Oil

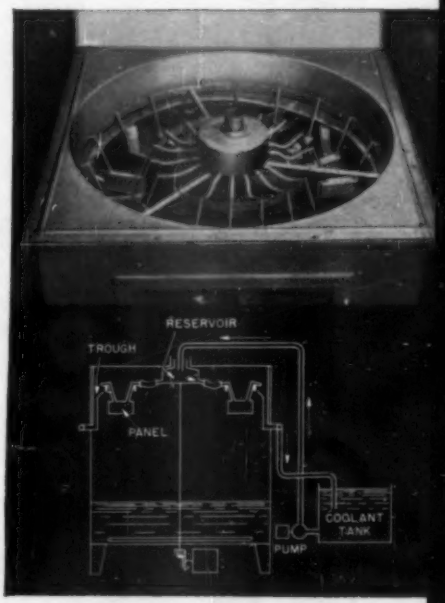
THE MAGIC BOX

Corrosion steals $5.5 billion from industry annually. Standard Oil is in the forefront of the fight to control this loss. Standard's research scientists have developed a new method for measuring the effectiveness of rust preventives. This new test takes less than one-twentieth of the time of previous tests—and is about three times as precise.

Using a controlled humidity cabinet for testing corrosion, these Standard research men installed a system for cooling metal test panels (previously treated with rust preventive) so that their surface temperatures are lower than the temperature in the cabinet. Temperatures of panel surfaces and of cabinet atmosphere are held accurately. Controlling the temperature of the panels controls the rate at which water condenses on them. This in turn (for the first time) permits accurate control of the amount of condensation on the panels. Rust preventives are more speedily and precisely tested. Science, as a result of this work, has a new tool with which to test corrosion.

This is the research pay-out industry receives from Standard Oil. This is the something extra that backs up the Standard industrial lubrication specialist who calls on you. This is the something extra found in the products he sells.

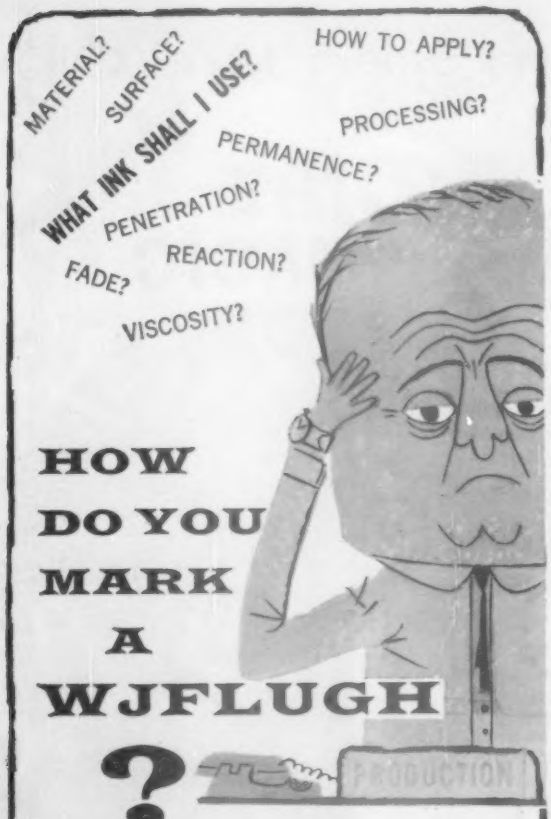
To know more about how Standard Oil industrial lubrication specialists—and Standard's research program—can help you, call the Standard Oil office nearest you in any of the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.**



Top view and cross section of Accelerated Condensation Corrosion Test cabinet.

You expect more from STANDARD and get it!

Edgar A. Dieman, Standard Oil scientist, inventor of new Rust Preventive System, inspects metal panel that has undergone test in the humidity cabinet.



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Begins on page 186

tions of all the applicants. Then segregate those whose qualifications are relatively equal. Finally, give the job to the most senior of this group.

Frey further stated that, subject to review by the union, it's up to management to determine relatively equal abilities of employees. If the union challenges, then management has the burden of establishing that its standards were set up in good faith, were adequate on their face, and were fairly applied. Aptitude tests were an approved part of the procedure.

Soldiers' Job Rights

This comes right from the United States Supreme Court. An employee back from military service need be given only those promotions that were based on seniority or were automatic—which he would have received had he been on the job. On his return, he need not be given promotions based on merit or those that involve company discretion.

The Universal Military Training and Service Act does not guarantee a perfect reproduction of the civilian employment that might have been his if he had not been called to colors, said the Court.

Pension Won't Stop Jobless Pay

Connecticut's unemployment insurance law goes something like this: No benefits for any week for which employee was given dismissal pay, payment to compensate for loss of wages, or retirement pay or pension paid by company directly or indirectly.

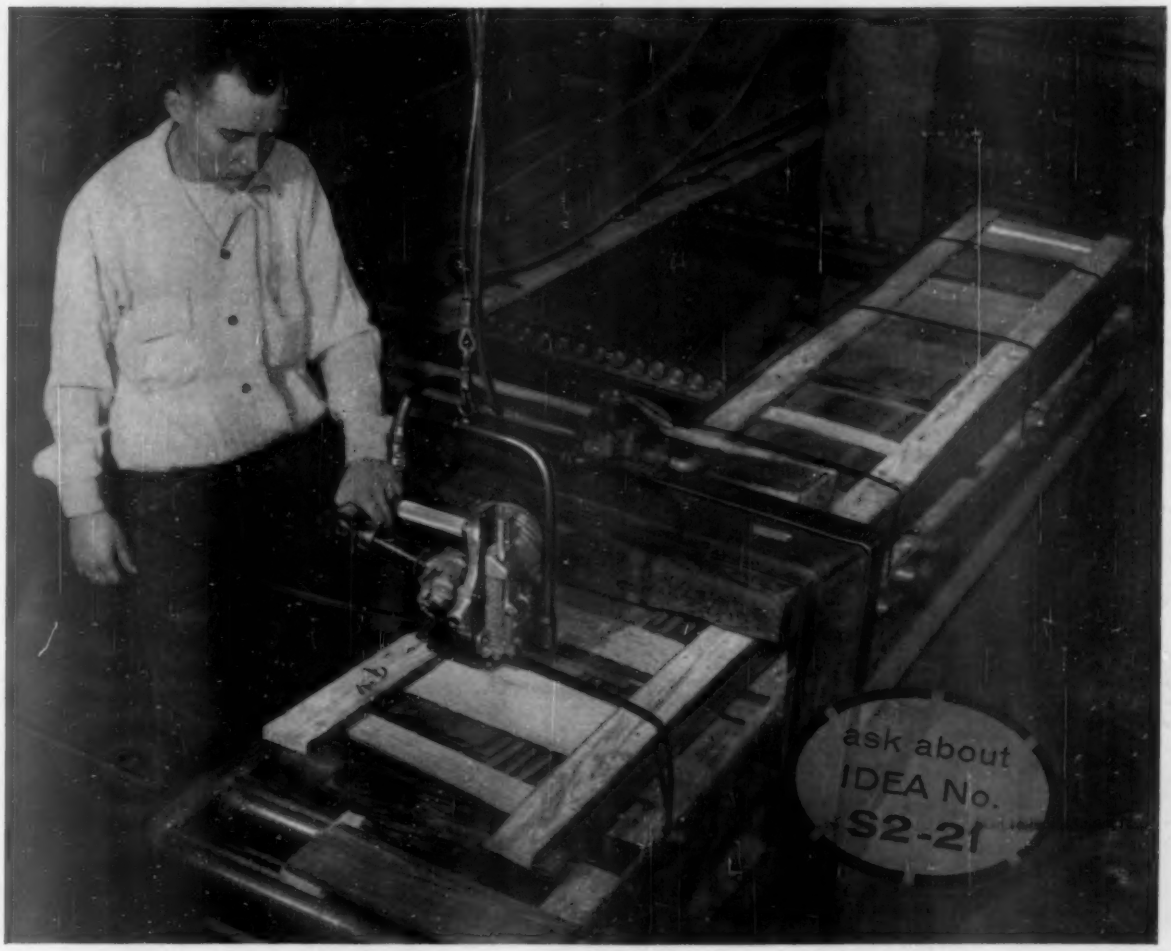
Here's a payment that seemed to fall in a no-man's land—that is, until a Connecticut court ruled that it was compensation for loss of wages. This company was the sole contributor to its pension plan. Fifty per cent of the employee's pension interest is vested after 5 years of service. After 10 years all is vested, to be paid on death, termination, or retirement. A member of the plan was terminated and was given $577 as her vested interest in the plan.

Quoting the court: "The payment was not paid as direct compensation for services rendered currently. It was paid in consideration of services rendered in the past. The plaintiff's employment was terminated and the payment was made to help her meet her expenses of living. Vesting is not the determining factor."

Unsigned Union Contracts

If you're like many perceptive plant executives from time to time, you'll wonder briefly about the validity of your union contract. You'll wonder about the importance of having both the local and international sign. You'll wonder which individual under the union's constitution is authorized to bind the union. But your worry will be brief, then you'll turn to other things.

The authority of the other party to execute a labor



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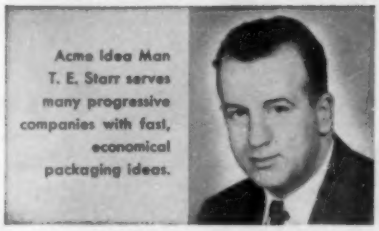

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ACME STEEL **STEEL STRAPPING**

contract becomes an earthshaking problem only once in a while, fortunately. But the problem did arise a while ago for the Inland Steel Products Company.

In 1953 the Sheet Metal Workers Union (AFL-CIO) was certified as bargaining representative. Contracts were negotiated and signed for 1954, 1955, and 1956. In September 1956, agreement on a new contract was reached, drawn up, and signed by the company and passed on to the union for signature. A month later, the union's agent asked for a letter of intent setting forth the items to be manufactured. Needed it for executive board approval, he stated.

In January 1957, the union gave the company an additional list of items to which it could attach the union label and advised the company that the agent would sign the contract if the company agreed to some product limitations. "Nothing doing" replied the company. "Sign the contract just as it is."

The union agent stated he was instructed "to break the contract and get up a new one." Then in February the union wrote saying it had given up its right to represent the employees and wanted the union label returned to it by the company.

The National Labor Relations Board found the union guilty of refusal to bargain. There was no merit to the union's argument that the executive board and local membership had to ratify negotiated contracts. In this case, the union negotiators acted as if they had authority to bind the union; they acted as they had in previous negotiations, and they hadn't notified the company that their right to bind the union had been cut off. The contract was considered binding.

In determining who can bind the union, the union's constitution and by-laws are a good starting place. But, as in this case, you may find that past practice under the legal doctrine of apparent authority may create signatories other than those set forth in the constitution and by-laws.

"Agency Shop" Approved

Right-to-work laws forbid making union membership a requirement for the job. In some states the law goes further. Employees cannot be compelled to pay initiation fees and dues.

This proviso was just tested by an Indiana Court, which ruled that "agency shops" were okay in that state. That is, it's okay to have a contract clause compelling non-union employees to pay dues and fees levied against union members.

The company involved had argued that the "agency shop" clause was a "strained, fanciful, variance of form and not substance."

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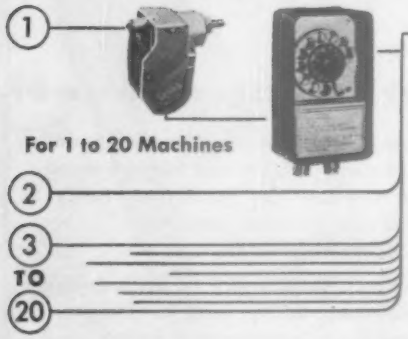

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Why *Pangborn* Dust Control? Because Pangborn offers the most efficient methods of dust collection on the market. Pangborn has spent 50 years dealing with dust problems . . . experience that is incorporated in every proposal. And Pangborn's extensive line of wet and dry collectors means that one of these units can be adapted with maximum effectiveness to *any* problem.

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FACTORY
MANAGEMENT AND MAINTENANCE

BOOKS

By CARROLL W. BOYCE, Manager, Features and Departments, FACTORY

Now – Queuing Made Practical for All

If you're looking for a way to make big savings immediately—and who isn't this year especially—get a copy of *Finite Queuing Tables*. If your local bookstore doesn't have it (chances are it doesn't), don't lose time with the mail; telegraph a money order to the publisher.

Most investments are considered pretty good if you recover your original outlay in one or two years; excellent if they pay out in three to six months. Depending on the size of your plant, you can recover the $8.50 price of this book tenfold up to 1000-fold in 30 to 60 days.

That's a tall claim, but this is a fantastic book. Ever since "queuing theory" was first "invented" by Erland of the Danish telephone company just after the turn of the century, it has been strictly for the long-hair mathematicians. Full of high-powered theory, its application has been bedevilled by the need for reams of tedious, complicated computations. Result: It was used only by a few companies (and the military) with crackerjack staffs and access to high-speed computers. This book removes that limitation from literally thousands of possible applications. The "answers" are all here, with nothing more involved than straightforward multiplication and division.

Obviously, not every problem involving queuing theory can be solved directly from the tables; some are not susceptible to this approach. But a great many industrial problems can be tackled this way.

There's not much text in this book (mostly, it's just tables, reproduced by photo-offset exactly as "printed out" on the Univac that made the computations). But what little text there is commits a grave error: It starts out with a mathematical derivation of the generalized theory of queuing. It's only four pages, but enough to chill an ordinary engineer with only 2½ years of M.I.T.'s calculus behind him. Happily, you can skip it, and get right to the specialized case of "finite populations." This is what the tables are about anyway. And except for four derivational formulas that you can bypass with no loss, high school algebra and a small amount of patience will see you through the rest of it.

Where can you use queuing to advantage? To determine the most economic number of fork trucks for interdepartmental handling. Number of service windows for a tool crib or parts storeroom. Number of truck docks. Handlers to assign to the truck docks. Set-up men for a machine shop. Looms per man. Crews to assign to relining open hearths. Washfountains in a locker room. Time clocks. Or interviewing rooms in a personnel department. Or (to cite an unusual example from the book) number of electric circuits to serve a welding department.

With a bit of imagination and ingenuity, you can think of a dozen or a hundred more with direct application to your business. Then, depending on how difficult you find it to get records on frequency of occurrence and time costs for labor, machines, lost production, downtime, etc., the data in this book will let you construct "optimum cost" tables in a matter of a couple of hours, and maybe less.

Now that we've made the point that this book can be a bonanza for any smart operating man without special training, let's get another point on record. It will be doubly useful in the hands of an operations research group or top-flight industrial or plant engineering department. They will be able to use it for many sophisticated applications previously considered impractical because of the time and cost involved in computations.

A final note: If you missed Morse's *Queues, Inventories and Maintenance* (reviewed in April FACTORY; published by Wiley), pick it up now. With the book of tables in hand, Morse becomes less of a jet-propelled excursion into abstract theory, and more of an idea book for possible applications of queuing. It's still tough reading, but if you breeze lightly through the formulas, it will reward you.

By L. G. Peck and R. N. Hazelwood. John Wiley & Sons, 440 4th Ave., New York 210 pages. $8.50.

"Reader" Is Light and Enlightening

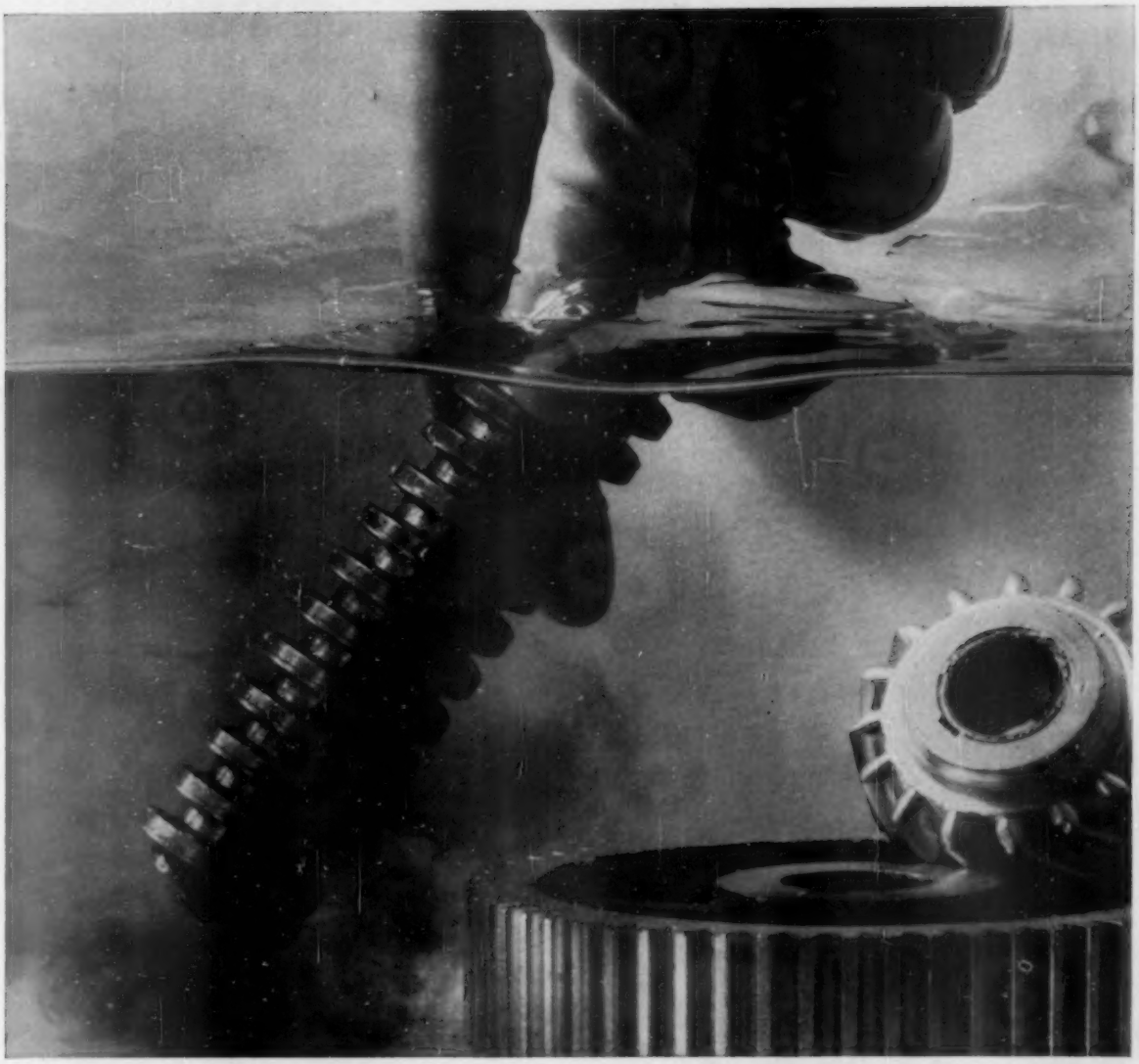
Here's a book that is well worth your attention. At an average cost of less than a dime apiece, the *Business Communication Reader* gives you a collection of 62 essays, speeches, magazines articles, and book excerpts ranging from the famous encyclical of Pope Leo XIII on "The Condition of the Working Classes" to Roger Blough's statement about "Phantom Profits" made to the U. S. Steel stockholders.

The book has nine sections, covering such varied topics as developing communication skills; symbols of communication; economic man; moral values in business; business man in American literature. The latter includes well-selected passages from *Babbitt, Executive Suite,* and *The Man in the Gray Flannel Suit*. Final section of the book is devoted to "The Office"; it includes four pungent and often hilarious satires on office life.

To improve your communicating skills (ostensible purpose of this volume); to add to your knowledge of business practices and business men; or just for enjoyable, pick-up reading, *Business Communication Reader* rates star billing.

Edited by J. Harold Janis. Harper & Brothers, 49 East 33rd St., New York 16. 369 pages. $6.

Turn the page



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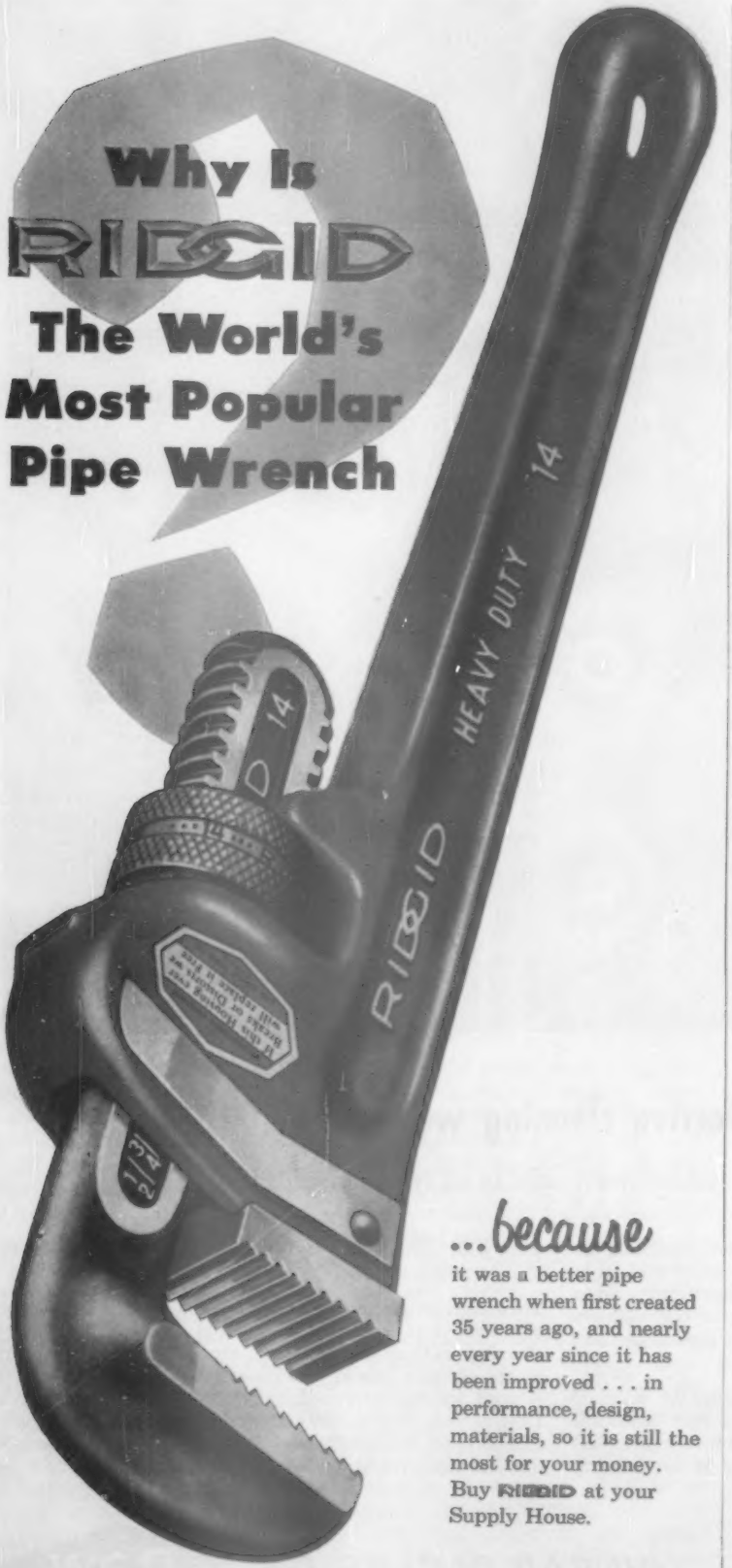
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Begins on page 194

Labor—Intended as a college text, this is as well-rounded and incisive an analysis of the role of organized labor on the industrial and political scene as any we've read. Neil Chamberlain is one of the most distinguished and keenest observers in the "post war generation" of labor economists. His book is a sound treatment of fundamentals for the nonspecialist and an illuminating excursion into the philosophy of labor's future contribution to the economy. It will stimulate even the seasoned "old pros."

Chamberlain uses a fascinating gambit in his presentation: After carefully leading up to a "pro-labor" conclusion, he turns Devil's Advocate and proceeds to rip it to pieces; he does the same after developing an "anti-labor" conclusion. It's a tricky technique, but Chamberlain brings it off nicely, forces the reader to think for himself.

You can't tag anything "definitive" in so dynamic a field, but it's our guess you may have to wait five years or even ten before you can find another "basic" text good enough to obsolete this one.

By Neil W. Chamberlain. McGraw-Hill Book Co., 330 West 42nd St., New York. 625 pages. $7.

Scientific Programing in Business and Industry—Devoted almost exclusively to linear programing. However, it goes far beyond most of the earlier treatments in that it gives excellent coverage to convex programing and dynamic programing (both of which are extensions of linear programing that give it a previously unattainable realism in industrial situations). A long chapter —and a good one—on statistical inventory control veers off the straight-and-narrow "linear" path, but not very far.

Vazsonyi has made the closest approach yet in this field to a book that can be read and understood by a man without a Ph.D. in mathematics. He explains, as the publisher's blurb claims, programing *in terms of business* (rather than as abstract mathematical concepts). But this does not mean he avoids a welter of mathematical symbology. From the point of view of utility

to the operating man, we'd give the author an A for his effort and about a C-plus for accomplishment (which is quite something when you remember that previous efforts have met with almost complete failure).

But don't think this book is easy weekend reading. The author recommends it be read by a team of two—one of whom is a trained mathematician or statistician (say a quality control expert). And he offers this discouraging note:

"How long will it take the reader to study this book? If mathematical thinking comes easily to him, perhaps a couple of months will do."

We suspect that's overly conservative. But we can report that even for someone who has read several previous books on linear programing with a degree of understanding (though not with a practitioner's facility), it took about 35 hours to read it through, not to study it.

One wonderful plus: A series of 3-dimensional graphical representations of linear programing and game "solutions."

One minus: Some disconcerting typographical errors, a couple of them in key spots that make it difficult to follow examples. (Publisher would do well to print an errata sheet to accompany the book.)

In sum: It's the best book to date for any individual or company with a serious interest in programing.

By Andrew Vazsonyi. John Wiley & Sons, Inc. 440 Fourth Ave., New York 16. 474 pages. $13.50.

Retirement Planning Guidebook—It's a nicely illustrated, fact-packed job with lots of sound advice for people looking toward retirement. While primarily intended for the 60-plus group, it is anything but a waste for the man of 40 or 50 who's willing to recognize the benefits of planning well in advance for a period in his life that will probably last 15 to 20 years.

Much that has been written about retirement is either "preachy" or avoids entirely such distasteful subjects as meager financing, possible ill-health, pre-decease of wife or husband, etc. This book handles these matters forthrightly, even if it does tend to over-emphasize the

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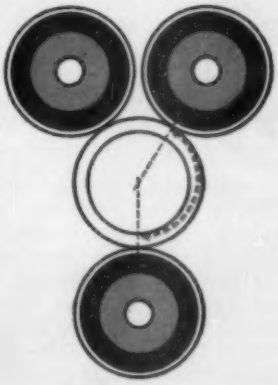

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Begins on page 194

silver-lining aspects of these dark clouds of retirement.

If you're smart enough to want to start planning now for your retirement, this book is for you. And if you're a personnel manager, you'll want to consider it for your company's pre-retirement program.

Published by The Retirement Council, 1 Atlantic St., Stamford, Conn. 96 pages. $2.50.

Automatic Process Control—This is planned as a textbook for undergraduates. But don't overlook the warning in the preface: "A knowledge of calculus, differential equations, mechanics, thermodynamics, and fluid mechanics is assumed."

For the engineer who can take that warning in stride, this is an excellent treatment of automatic control. It starts with the basics, carries right on to the more sophisticated applications of automatic process optimizing through the use of on-stream computers.

For the non-engineer, this book will appear to be an excursion into Never-Never Land. But whether you relish the prospect or not, that's exactly where your engineer-colleagues will be spending an increasing amount of time if your company is to survive the competition ahead.

By Donald P. Eckman. John Wiley & Sons, 440 Fourth Ave., New York 16. 368 pages. $9.

Labor Unions and Public Policy—Here's a collection of four "papers" on possible labor legislation:

- E. H. Chamberlain—"The Economic Analysis of Labor Union Power."
- Philip D. Bradley—"Involuntary Participation in Unionism."
- Gerard D. Reilly — "States Rights and Labor Relations."
- Roscoe Pound—"Legal Immunities of Labor Unions."

The labor relations specialist will find this a thoughtful and provocative—even if sometimes rather opinionated—analysis of some of the most trying problems facing the nation's legislators today.

Published by the American Enterprise Association, 1012 Fourteenth St., N. W., Washington 5, D. C. 177 pages. $4.50.

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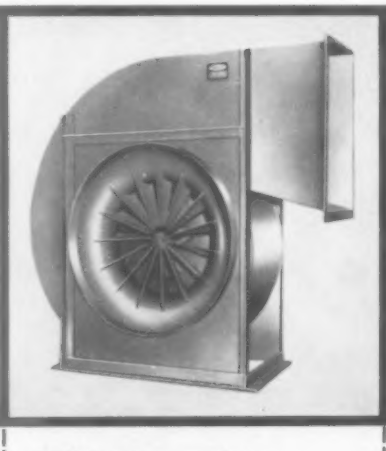

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See—Hear, Mr. Businessman is the 1958-1959 catalog (56 pages) of films and filmstrips available from the City College of New York Audio-Visual Center. Free. Write the Center at:

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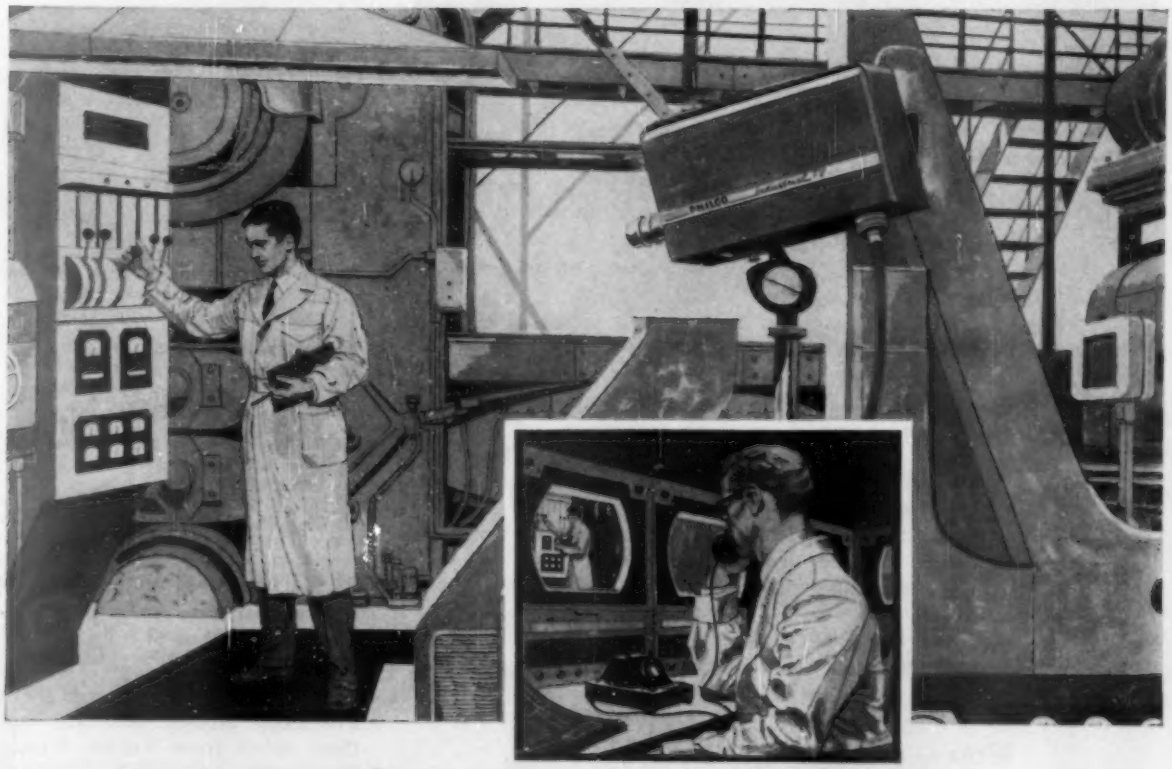

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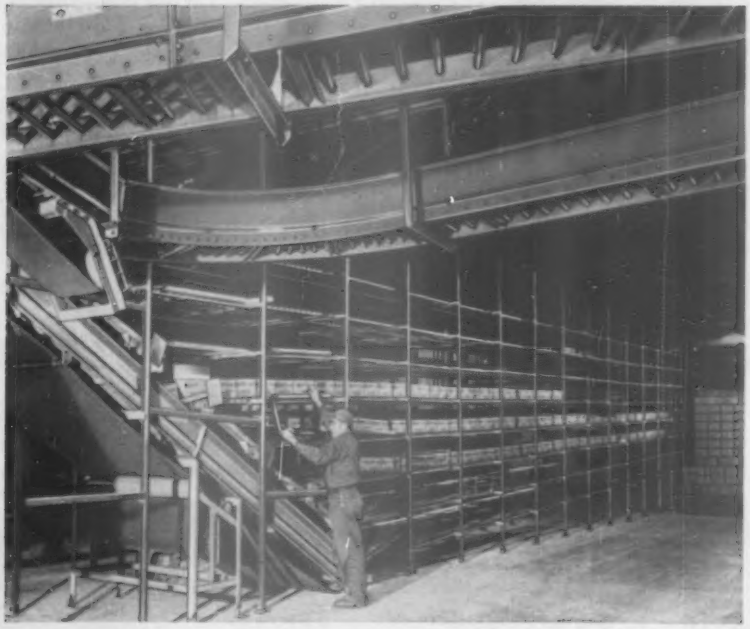

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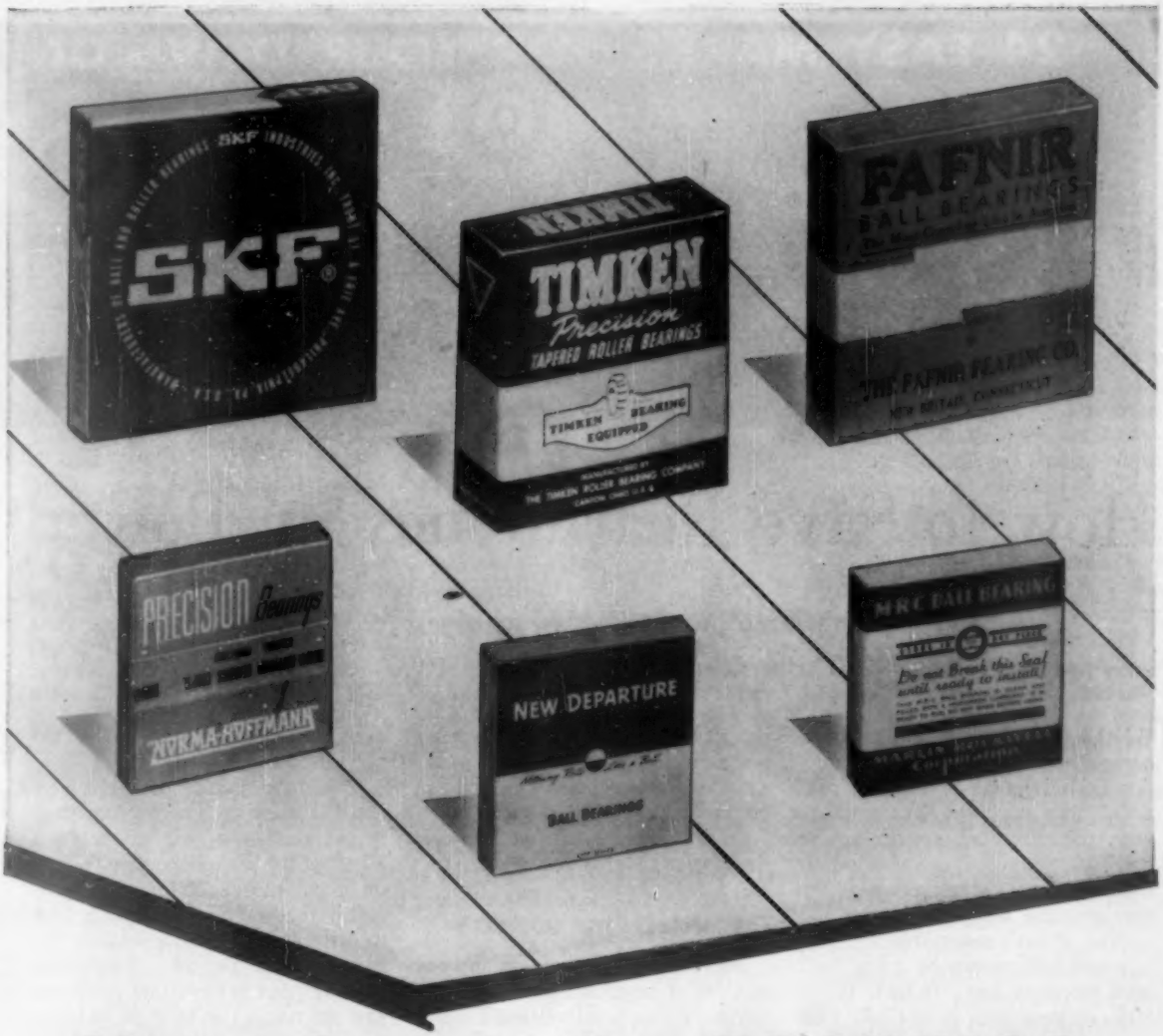

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13. Missing pilot lights
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15. Overheated work areas
16. Poor lubrication

How to Save Real Money on Power

And we don't mean peanuts. This exclusive FACTORY survey brings you easy-to-use ideas that will trim your power bills up to 10%—and maybe more.

WHO SAYS you can't cut electrical costs the same way you cut production costs? Defeatists do. "It's peanuts," they say. Or "You're stuck with the electrical system you've got." Or "You can't go after power with methods improvements—the way you can with production."

Well, it ain't necessarily so. You can save real money by going hard after electrical costs. In fact, 3% to 10% of your total power bill. One company we know went as high as 25% for a neat gain of $96,000 last year.

How do we know there's money to be saved on power? FACTORY asked seven of its news bureaus around the country to call on half-a-dozen plants each, supply us with raw data for a down-to-earth report on what companies are doing to cut electrical costs.

Here are the results of some three-dozen interviews — analyzed, summarized, and organized into a what-you-can-do-in-your-plant article by Jerry Quinn, FACTORY's Electrical Services Editor.

START WITH GROUND RULES

There are four of them. They're the basis for any intelligent power cost reduction program:

. . . *Use only the power you need* to do each job.

. . . *Keep power shut off* when it's not needed.

. . . *Don't waste power* through an undersized electrical system.

. . . *Take every opportunity* to get the lowest possible power rate.

ORGANIZE THE ACTIVITY

Success doesn't hinge on any one method of organization. What's important is that you think out a method and give it management support. The survey shows all three of these methods are successful:

. . . *Relying on employees* to cut power waste and come up with suggestions. Promoted by house-organ articles, posters, discussions.

. . . *Setting up a staff or committee*, part or full time, to plan and effect power cost reduction.

. . . *Fixing responsibility* on plant supervision, with final responsibility on each foreman to cut power waste in his area.

Here's how two of the plants in FACTORY's survey got organized, then went after power costs:

Grass roots approach—Square D Company's power costs are major. Right now the company's Detroit plant (7000 employees) has a vigorous power conservation program under way. The program capitalizes the experience that Square D's product engineering staffs have built up over the years surveying power usage for customers.

The drive started with meetings and discussion groups covering nearly everybody—to win cooperation all along the line. Since then posters on employee bulletin boards or articles in the house organ have helped to drive home the close relation between savings and jobs. Employees are reminded to switch off machines that are not in use, turn off all lights in areas unoccupied for half an hour or more.

Square D's business reaches a peak in the spring, when residential building surges. To level off demand peaks the company is now trying to space operations evenly throughout the year.

"We've had wonderful cooperation—cooperation that we wouldn't have had eight months or a year ago," Square D reports.

Payoff: Elimination of overtime work has cut lighting costs. Over-all savings: "Terrific."

Task force approach—Automatic Electric Company's new Northlake (Ill.) plant—telephone and electronic equipment—has a full-fledged program to trim power costs.

Last February the company president, H. F. Lello, gave Robert Muchow, assistant to the vice president of production, the job of cutting power costs. Muchow called on An-

thony Giovenco, supervisor of electrical maintenance. Giovenco's staff started by finding just what equipment was in use on what lines before seeking lower power costs.

Each of the 14 feeders from the main substation was hand-metered around the clock. Motor loads per shift for each feeder were found from questionnaires sent to foremen of the 42 departments in the manufacturing area and 17 departments in the office area. The utility's engineers were consulted on matters on which they could help.

Three new turn-on/turn-off schedules were drawn up: for area lighting; for process equipment and exhaust; for exterior lighting (mainly adjustment of timing devices).

To improve power factor (PF) some induction motors were replaced with synchronous motors. Others (oversize) were replaced with motors of smaller horsepower.

The survey studied each load individually, thus uncovered many potential economies (e.g., replacing power conveyors with gravity).

Right now Automatic Electric is thinking of installing PF meters on feeders so poor PF in one area won't go unnoticed. In any case, says Muchow: "We're still going on with the program. We'll probably find other things we can do. Results so far show the drive has been well worth while."

Payoff: Current monthly power bill is running about $26,000 compared with a former $34,000—an $8000 saving. About $2100 came from better balancing of feeder lines; probably $4200 came from the new turn-on/turn-off schedules. Employee cooperation has been good.

COVER THE OBVIOUS

Here are a few examples of what we mean by the obvious—the things that crop up again and again in the survey. The real trick is to keep at all those that apply in your plant all the time.

Turn off lights, idle machines—This kind of waste sticks out like a sore thumb. Standard Railway Equipment Manufacturing Company (600 employees—Hammond, Ind.) handles this situation typically. It studies power costs continually, has had an informal campaign under way at the foreman level since the first of the year. Employees switch off machines and lights when not in use. Plant guards do the same when they see no one around.

You can check whether it's easy for employees to turn off lights or machines. Are switches too high to reach, too far away to walk to, mounted behind a stack of stock boxes? Are there areas where you can't cut off part of the light when it's not needed—where all fixtures in an area are on one switch?

A few dabs of paint on switches will tell everyone whether this light ought to be off or on at any particular time. Same trick works for control switches at Continental Can Company's Research Laboratory (Chicago). All Continental Can's lab fans and exhaust motors are switched from a single control panel. One of five different color tabs is pasted adjacent to each fan switch. Color-coded instructions alongside tell what switches should be turned off or on at what time. System costs very little to set up, saves power, eliminates operator confusion, can be changed at will.

Plants in the survey report that they assign guards, inspectors, foremen, and maintenance electricians to the job of patrolling against wasted power. Many, like Convair in Dallas, give sanitation personnel the job of turning off unneeded lights or machines. Some plants equip power conservation employees with tags that serve as a reminder to the machine operator (or his foreman) that "this machine (or switch) was left on last night." The number of tags needed serves as an index of employee cooperation.

Use automatic timing switches—They're convenient and economical. But only a few plants use them extensively. Some plants in the survey report that centralized systems that remotely control switches throughout the plant from a master control panel really cut power waste. For example, Marchant Calculator's new Oakland (Calif.) plant has a central control system for its lighting system and much of its production equipment. And the new Dallas plant of Texas Instruments, Inc., installed this same system after studies proved it would pay off soon. The plant can override the pre-set program as needed.

A word of caution on excessive use of automatic (or manual) shutoff for short periods. Don't shut down rotating electrical equipment where power savings could be less than the increased maintenance. Starting duty on some motors (or driven loads) is so severe that it may not make sense to try to economize this way. Your equipment supplier should have the answer. Dorr-Oliver Company (Oakland, Calif.) reports it has tried automatic switches on welding machines but that its maintenance bills more than offset the power savings.

Turn the page

FREE FILE COPY of this article available while supply lasts. Circle FC-12 on Reader Service Card next to back cover. For complete FC list, see page 204.

Try photocell controls—They can save money, control lighting for parking lots, signs, outdoor storage areas; also compensate for seasonal or weather changes. Convair's Dallas plant figures the units do a good job on outside lights.

Watch your production lighting—Too much light when production is off is a power waster. One West Coast auto plant cut power bills appreciably by cutting off every third light in the warehouse. No use lighting large areas at full intensity when production may be confined to limited areas that can be handled with low-hung or stand-mounted fluorescents or incandescents. But get both sides of this story from a lighting expert first. You could save ones but throw away fives and tens in employee inefficiency or scrap losses. And how about those fluorescents that burn all day long next to unwashed windows?

Cut waste in plant utilities—Many of them depend on power. Go after things like air leaks or water running unnecessarily. For instance, Ford Motor Company's Milipitas (Calif.) Assembly plant cut its power bill by eliminating one of four 2000-cfm. compressors. Why? Because plant maintenance inspectors started checking air leaks and curbing employees' air-wasting practices. (Where two workers were blowing off same area of a car, hose was taken away from one.) An interconnection between compressors in various shops may be all that's needed to shut down all compressors but one on night shifts or weekends.

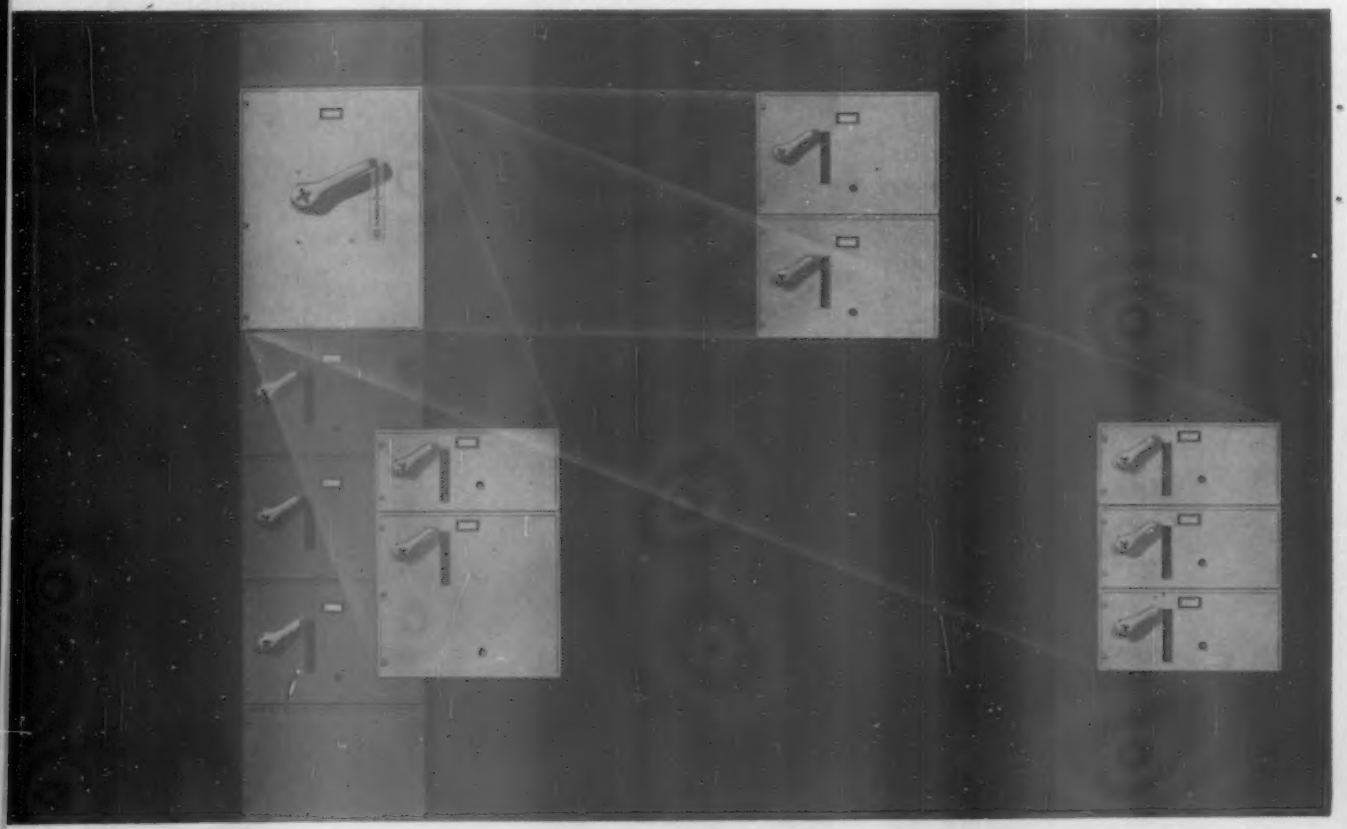
Cooling water flowing through idle production equipment is another place to look for savings. Cost of installing a solenoid valve is small compared to cost of wasted water. (Also add up what it costs to get rid of the extra sewage.)

Drinking fountains that run all night or flow too freely don't make sense. Many plants have never studied how far bubbler valves can be shut before water becomes warm —or how the cost of insulating a water line stacks up against the cost of a 250- to 2500-gal.-per-day-flow of water through a fountain.

Scan heating-cooling-controls — Convair at Dallas does. It finds that the right humidity permits a higher constant temperature in the air-conditioning system without jeopardizing employee comfort. Any saving in air conditioning load represents a substantial sum in year-round heating and cooling.

Don't shortcut on pilot lights—Most plants have lots of manually operated switches controlling furnaces, heaters, or remote draft fans where pilot lights were never installed or are burned out. Pilot lights are the cheapest way to flag operating and supervisory employees.

Keep tabs on transformers—Idle ones can be expensive. A typical load center substation uses $1 to $2 worth of power a day just in idling.



One Cleveland electrical manufacturer finds it pays to disconnect spare transformers and operate the remaining units at full capacity during slack production.

Go after the slack employee—The "big spender" who lets everything run while he eats lunch. And the worker (or foreman) who sees no relation between power costs and money for growth (or wages). Half of the surveyed plants who are doing anything about power costs report they're using posters. (North American Aviation at Los Angeles uses a catchy theme: "Turn off the juice—when it's not in use.") Others rely on house organs and group discussions. Some with branch operations (like Ford Motor) keep cost-consciousness high among supervisors by putting branch plants on a competitive basis. These report power, water, gas, other utilities on a cost-per-vehicle-assembled basis.

No one reports flagrant utilities waste as a cause for disciplinary action in the union contract. But it would make as much sense as penalizing high scrap production.

A business recession is an especially good time for a drive against power waste. The many reports in the survey of "excellent employee co-operation" bear this out. Why? Because the relation between jobs and profits is easier to see. Staff personnel are often more available for power cost studies. And night shift personnel are easier to keep if heavy daytime peak loads (like electric furnaces) need to be shifted to night for economy.

If you do go after employee co-operation, back up your concern over power waste with facts on what it costs to run a motor idle—or to light a bay when it's not needed—or to overheat an electric furnace or drying line. Drive home the fact that machine idling adds to maintenance costs and parts replacement—that unneeded lighting adds heavily to air conditioning loads.

Catch up the details—Here's more of the kind of waste plants report they're going after: Idling line shafts. Poor lubrication of motors or machines. Overheated ovens, furnaces, infra-red drying lines. Power-driven conveyors where gravity would do. Obsolete machinery that takes more power than modern machinery to do the same job. Production areas so overheated that windows have to be open in winter.

WISE UP TO POWER FACTS

Don't stop with the obvious things (above). If you do, you'll be missing opportunities. How far you go will depend on the manpower, the time, the instruments you have.

Metering—Best thing is to have adequate metering built into your distribution system. But you can do a lot with a few portable meters. At a cost of $700 or so you can buy enough meters for a round-the-clock check on voltage, current, and PF of suspected big power wasters, thus get the information you need for the next steps.

Motor loads—Your best start will come from a motor load survey. Plant after plant in FACTORY's survey reports that the biggest cause of excessive power costs is

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POWER-BILL SAVINGS

Begins on page 206

the oversized (or underloaded) motor. You can do some motor swapping without instruments (any motor cool enough to touch under full load is probably underloaded). But if you want real gains, you'll need real electrical measurements.

Why do plants get loaded up with oversize motors? Because too many guys think that if a little reserve capacity is good, a lot of it must be better. Cool-running motors are reassuring, but they're expensive—in original cost, in PF penalties, in wasted power. A few facts: A 100-hp. motor driving a 50-hp. load runs at 72% PF instead of 85%, uses 2 to 3% more power, and may cost $1000 to $1500 more than a 50-hp. motor. Sure, the bigger one is less likely to burn out. But it suffers from corrosion, moisture, dirt, and improper lubrication just like a smaller and less expensive motor. And costs more to repair.

Time to avoid oversize motors is when you're buying motors. Chevrolet's Los Angeles plant screens every motor order to make sure it will operate fully loaded. If you don't buy lots of motors, your big gains will come from swapping motors that are improperly installed.

How do you start? You can buy, borrow, or rent portable metering equipment (wattmeter, voltmeter, PF meter, and ammeter—or a package a-c industrial analyzer with all four in one case). Fact is, contractors, equipment suppliers, and utilities often provide this service. For equipment with a long-time load cycle the only safe way is to rely on recording instruments.

Manufacturers can tell you normal operating values for their motors if the nameplate doesn't tell you. Go after your biggest (and coolest) motors first. Most motors made in last few years are designed to run hot when properly loaded (FACTORY, January 1958, p. 70).

If motor current values are within about 10% of normal (allowing for unpredictable load variations), you needn't worry. But you should swap underloaded motors around so each one is suited to its load. You'll end up with some higher horsepower motors on the shelf. But the savings in reduced PF

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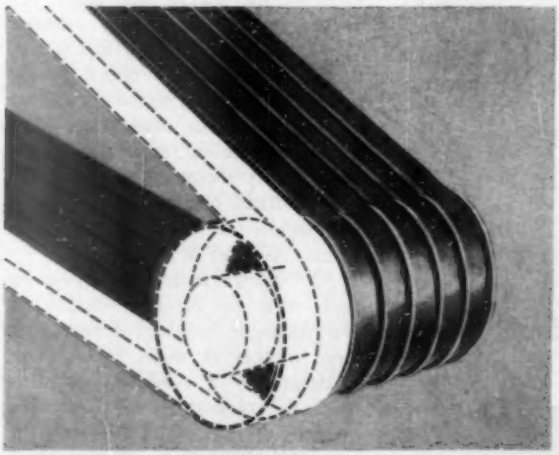
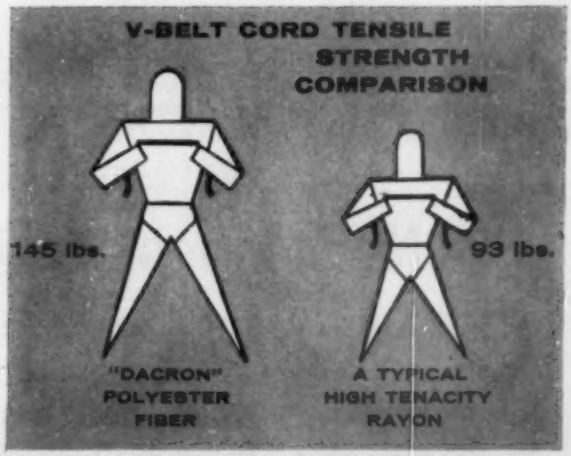
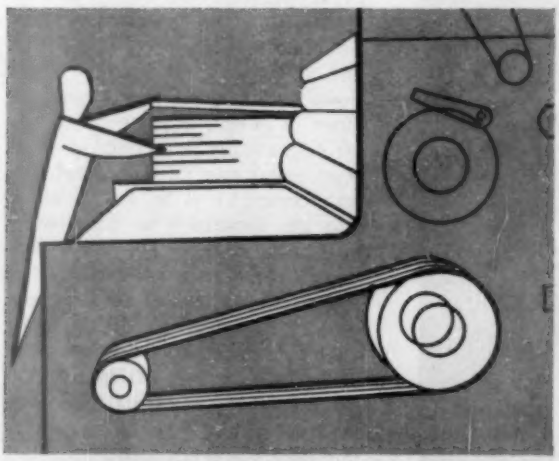


FEWER BELTS... SMALLER SHEAVES. You achieve greater design freedom with V-belts reinforced with DACRON fiber. Take advantage of their greater strength by using fewer belts and sheaves. Or you can increase drive horsepower capacity without increasing the number or size of sheaves. In a typical installation, 5 belts reinforced with DACRON do the work of 7 conventional V-belts.



IDEAL FOR HIGH-IMPACT OR SHOCK-LOAD DRIVES. V-belts made with DACRON have greater strength and ruggedness to withstand severe shock loads. When compared with tough fibers of a typical high tenacity rayon V-belt cord (Du Pont "Super Cordura"**), DACRON proved 52 lbs. higher in cord tensile strength! That's why V-Belts reinforced with DACRON last longer than ordinary belts.



SAVES VALUABLE MAN-HOURS. Smooth, efficient operation of V-belts reinforced with DACRON keeps production moving at peak capacity. V-belts of DACRON stretch less . . . eliminate the excessive cost of frequent downtime for belt adjustment. Their stability minimizes belt-matching problems, too.

V-belts reinforced with Du Pont DACRON* polyester fiber are stronger than conventional V-belts. Their greater strength means you can use fewer belts, smaller sheaves . . . and narrower drives make it possible to reduce shaft length. DACRON yields slightly under high impact, but resists stretch. Its low moisture regain minimizes matching problems . . . lowers belt inventory.

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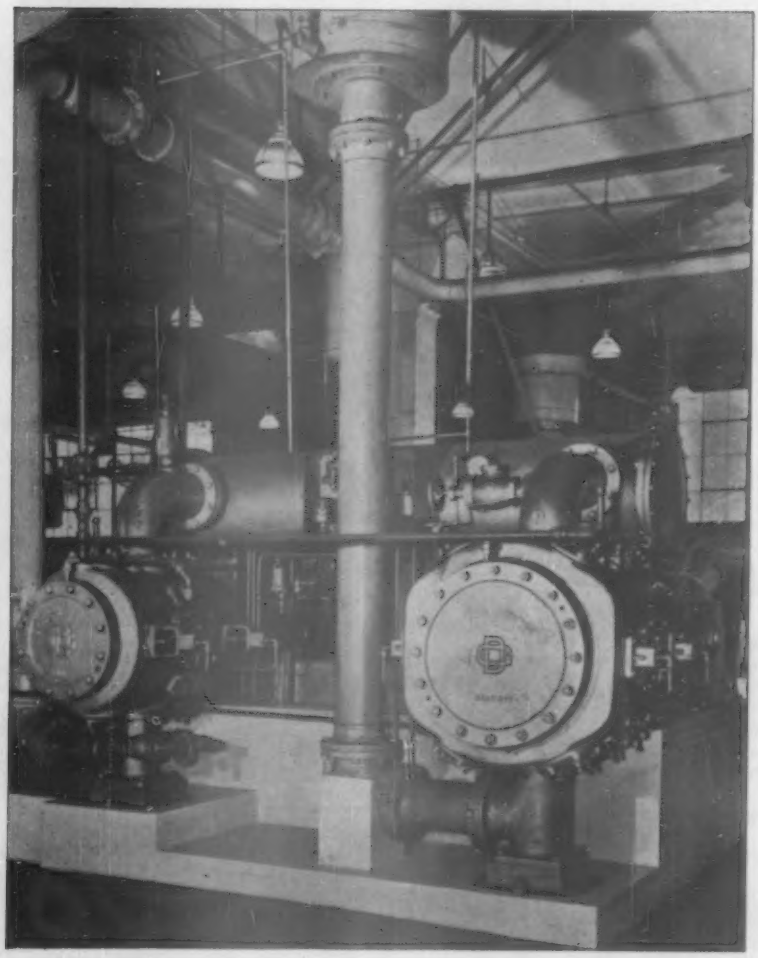

POWER-BILL SAVINGS

Begins on page 206

penalties and reduced power consumption are likely to be substantial.

Peak demands—Every supervisor in the plant ought to understand the penalty you pay for peak demand—how he could add $100 to the month's power bill by starting up a big motor at the wrong time. Most of the plants that tell FACTORY they're saving money through demand control report that they have to keep a check on the problem. Keeping penalty loads off the line calls for managerial skill, careful scheduling, and occasionally some pretty dictatorial decisions.

If demand penalty is your problem, follow the lead of the surveyed plants, go after it nine ways:

. . . *Shift heavy power-using equipment to off-peak operation.* For example, operate furnaces or large motors at night, when other loads are down. And rely on automatic timers to start and stop major loads unattended. W. P. Fuller Company (San Francisco) operates its paint mills over the weekend. Shutoff is automatic. Another company reports it allows no fire-pump tests except during lunch hour.

. . . *Stagger schedules for heavy power demand equipment.* On short-cycle operations the trick is to stagger loading so production goes smoothly as power flow shifts from one major load to another. Where power bills run $10,000 a month or more, a power dispatcher can pay his wages many times over. A more economical way (if plant operation isn't complex) is to tie an alarm into the substation to warn when load peaks near penalty point.

You can set up combinations of equipment that can be used without penalty. Federated Metals Company (San Francisco) saves $600 to $700 a year (on a $12,000 to $14,000 power bill) by requiring that operation of penalty loads be okayed by the plant superintendent.

. . . *Cut non-critical loads when production equipment requires maximum power.* Many loads can be cut off for 10 to 60 minutes without serious penalties. One western food products plant, for example, automatically drops part of its hydrogen-making process lines to standby when other plant loads are high.

POWER-BILL SAVINGS
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Many electrolytic processes can be performed at partial load.

Other places to look for short-time interruptible loads; lighting, mixing, tumbling, sump pumps, cranes, storage-type heaters, automatically controlled devices where the on-off band of operation can be widened without serious effect.

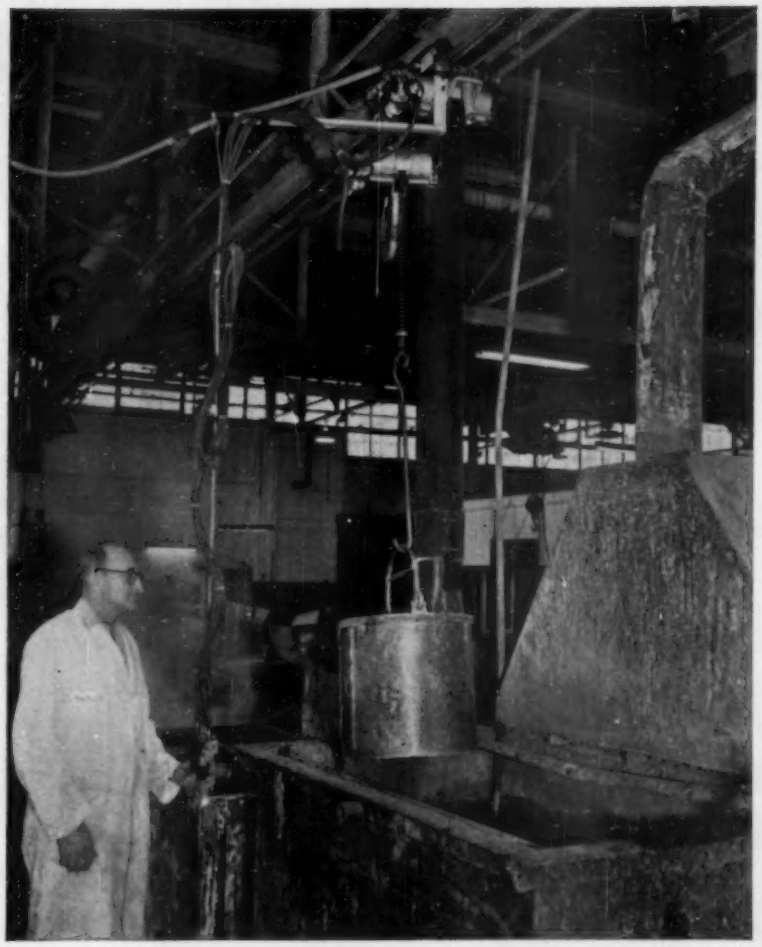
. . . *Install efficient modern equipment*. When you make equipment replacement studies, count the full penalty chargeable to the extra kilowatts taken at peak demand periods by obsolete lighting or heating equipment, motors, machine tools, or other driven equipment.

. . . *Schedule essential peak loads to take advantage of demand base*. Here's an area where few plants seem to be doing much. But one Midwest electrical manufacturer cuts about 5000 kva. from his demand charges this way. Demand charges are on a 15-minute base. Every quarter hour the integrating demand meter returns to zero. So this manufacturer starts occasional heavy loads of long duration 7½ minutes after meter has started its demand period, then runs through the first 7½ minutes of next demand period. Here he lets motor coast (or cuts power from furnace) until next demand period. Thus he gets 37½ minutes of peak power out of an hour without demand penalty. A 30-min. time base is better still.

. . . *Restudy your power contract*. You may get a more attractive contract if you'll take power at a higher voltage or under different conditions (interruptible or seasonal limits, etc.). Some companies turn over their power bills to consultants, who study them to find the most advantageous rates—in return for a percentage of refunds produced. Also you may save money if you own your own transformer.

. . . *Subcontract peak operations that add severe economic penalties*. Or team up with a neighbor to escape peak-load penalties. Look at how two North Carolina ice producers team up to save 25% on the cost of making ice. The big plant runs during peak summer production. The smaller picks up in October, handles it alone all winter.

Turn the page



New Hoistractor

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Let air muscle replace your tug-shove methods of moving heavy hoist loads. The new air-powered Keller Hoistractor can provide any beam hoist with the push-pull power needed to make load spotting and moving an easy task. It connects to the hoist by drawbar, rides the same beam . . . can move loads up to two tons. One simple hand control provides instant command of both "up-down" and "push-pull" operations.

Write for Bulletin 87-1 for complete details.

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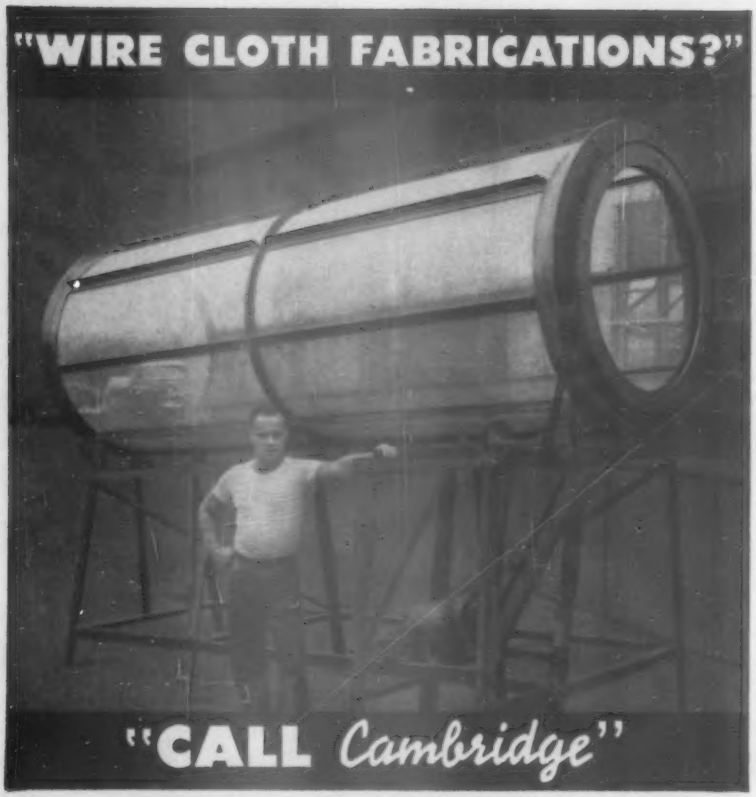

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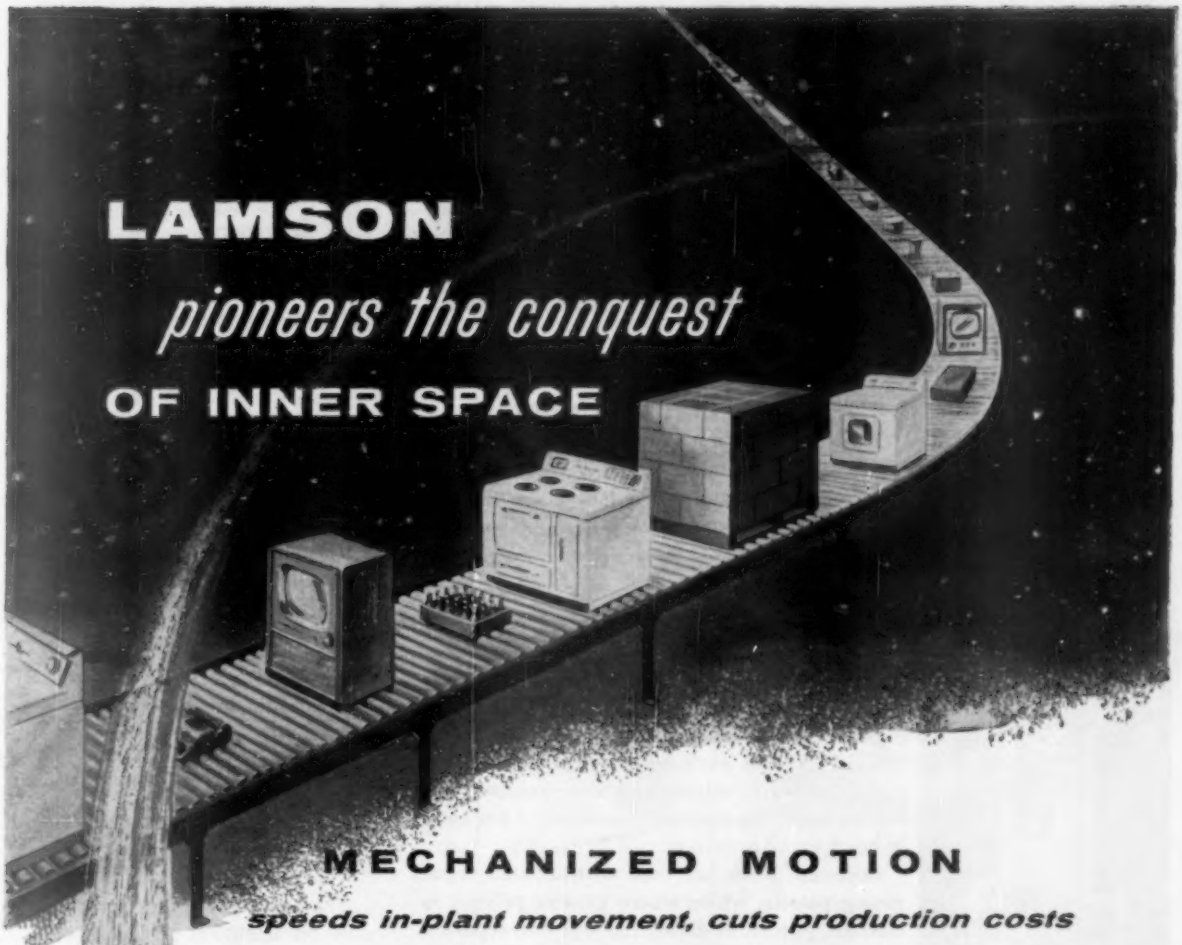
. . . Install your own generator. The cost of peak kilowatts for short intervals is sometimes so high that it's cheaper to generate your peak power, especially when you need auxiliary generating equipment anyway (for emergency) or where cheap process steam is available. *. . . Consider alternate sources of energy.* Maybe your answer to power cost is to switch to gas heating or steam drives for jobs that put a month-long penalty on the power bill for a few peak hours.

Poor power factor—It's a big source of costly penalties. Why? Because the utility (and you, too) must provide generation and distribution capacity out of proportion to the indications on the kilowatt-hour meter. Ideal PF is 100%. An induction motor, for example, that has a PF of 90% fully loaded may run 80% at half load. Only two things can keep your motors from causing PF penalties: (1) lots of electric heating or incandescent lighting (both of which run at nearly 100% PF and thus dilute the effect of motor and other inductive loads). Or (2) PF correction equipment, like capacitors or overexcited synchronous motors, that will cancel out the PF drag of motor loads.

Best way to get PF under control, keep it there: Evaluate PF penalties every time you add significant motor loads or change major production schedules. A 1955 PF study in your plant may not be valid today. The reward for bringing PF up to the typical 85 to 95% preferred by utilities is so great (2 to 5% or more saved on your bill) that PF correction equipment usually pays off within three years.

Take Chevrolet's Los Angeles plant, for example. It keeps PF high by purchasing capacitors with every new induction motor of 10 hp. or more, then connecting it so it will be switched on and off with the load. This technique reduces motor-starter load—and starter costs, too. Nearly all plants that told FACTORY of real success in their power cost-cutting effort have installed either capacitors or high-PF synchronous motors for base loads like air compressors and pumps.

The same metering equipment



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speeds in-plant movement, cuts production costs

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For more facts circle 590 on Reader Service Card

Excerpt from Feb. 10th issue of NEWSWEEK

When employes itch, they scratch—and in the process they cost U.S. industry an estimated $100 million a year.

Industrial dermatitis, ranging from falling hair and simple rashes to clusters of boils that are slow to heal, may be caused by any chemical compound that the worker handles, from metallic salts to fat solvents. But with today's constant changes in industrial techniques, company skin specialists must keep a constant watch for new, obscure occupational irritants, warned Dr. Donald J. Birmingham, chief dermatologist of the U.S. Public Health Service at Cincinnati.

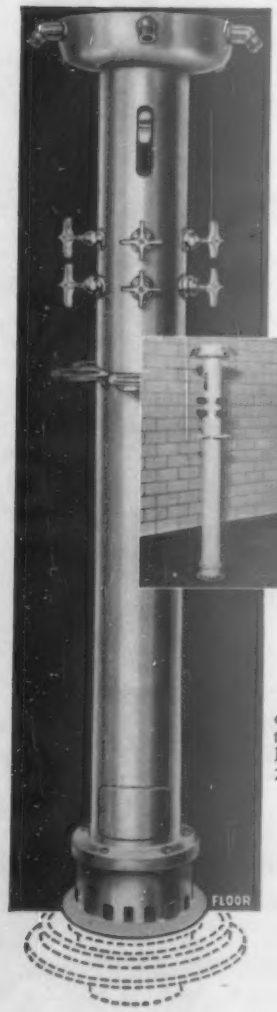
The most reliable preventive measures, according to dermatologist James W. Jordon of Buffalo, N.Y., are: Air conditioning, to get rid of dust to which some workers are sensitive; protective clothing (such as heavy aprons, helmets, and gloves that fit into detachable sleeves), and showers before leaving work.

"SHOWER BATHING... before leaving"

Reliable preventive measure against industrial dermatitis

Included in the preventive measures mentioned by dermatologist specialists—"Shower before leaving work" is important.

INSTALL BRADLEY SHOWERS NOW



Bradley Multi-Person Shower Units come partially assembled, saving installation time and expense. One Bradley Column provides up to 5 showers with each bather having complete control of water volume and temperature. Only *one* set of piping connections required for each 3- or 5-unit Shower.

Columns alone are used without stall separating panels; while where greater privacy is desired, partitions divide the unit into separate stalls furnished with or without curtains.

Above, at left: Shower Columns without stall partitions are illustrated.

Above: Bradley multi-person Shower with partitions and curtains.

Catalog 5601 includes illustrations, dimension data, and complete specifications. Why not let us mail you a copy. BRADLEY WASHFOUNTAIN CO., 2215 W. Michigan St., Milwaukee 1, Wis.

Write for Catalog 5601 which includes all dimensional data.

BRADLEY multi-person SHOWERS

Distributed Through Plumbing Wholesalers

POWER-BILL SAVINGS

Begins on page 206

you use to determine motor loading will tell you where to look for bad PF. Utilities and equipment manufacturers will usually give all the help you need on the problem.

JACK UP DISTRIBUTION

If your distribution system is inadequate you're paying for more than inconvenience. Cost of excess voltage drop in undersize cables is easy to figure—multiply per cent voltage drop by dollars in kwhr. cost for area the cables serve. Ideal system design allows for a 2% average voltage drop. If average load is 10% under voltage, roughly 8% (10%-2%) of your bill is just for excess heating of cables (assuming good power factor).

The other penalties of poor distribution—severe duty and shorter life for equipment, improper operation of equipment or control—are not so easy to measure in dollars. But they may cost more than the cost of the power lost.

KEEP AFTER YOUR GOALS

The ideas above are just a good start on trimming power costs in your plant. Once you've made a start you'll have to keep at it—as you always do when people are involved. It may not be a full time job for a committee or a staff man—but you can't forget it. Because, unless management provides continuing enthusiasm and good example, costs will climb again.

You'll find more help

. . . on power bills in these articles in your back issues of FACTORY (no reprints available):

"How to Pick the Best Voltages," March 1957.

"More for Your Electrical Dollar," July 1956.

"How to Upgrade Your Plant's Electrical Performance," Part 1, November 1954; Part 2, February 1955.

"How to Cut Your Power Bill," September 1953.

"Getting the Most for Your Power Dollar," March 1953.

BASIC MODEL

Model 600

One bench top (steel, Presdwood-covered steel, ShopTop or laminated wood), two sturdy steel bench legs, and one bench stringer.

Space Engineering with Standard Units

is a cost-reducing advantage of all HALLOWELL Shop Equipment

Typical installation of HALLOWELL open type work benches. They can be set up in continuous line, back to back or individually as required.

Outfitting plant areas with specially designed and built shop equipment is a costly, time-consuming operation. And the equipment lacks the versatility to meet changing conditions. Space engineering with standard HALLOWELL Shop Equipment overcomes all these disadvantages. Its cost is only a fraction that of custom built units. It is carried in stock by leading shop equipment dealers, is easy to order—and deliveries are excellent. It is extremely versatile. Standard HALLOWELL interchangeable accessories (drawers, drawer tiers, end pieces, backboards, top and lower shelves, utility cabinets, storage wall units and electrical panels) can be added as needed to increase the usefulness of this equipment. Units can be rearranged to meet changing requirements.

Ask the authorized dealer nearest you for complete information on the standard HALLOWELL line of work benches, shop desks, stools and chairs, tool stands, cabinets, storage walls, and shelving. Or write Hallowell Shop Equipment Division, STANDARD PRESSED STEEL CO., Jenkintown 11, Pa.

SPS **Jenkintown • Pennsylvania**

Standard Pressed Steel Co. • The Cleveland Cap Screw Co. • Columbia Steel Equipment Co. • National Machine Products Co. • Nutt-Shel Co. • SPS Western • Standco Canada Ltd. • Unbrako Socket Screw Co., Ltd.

For more facts circle 592 on Reader Service Card

FACTORY
MANAGEMENT AND MAINTENANCE

CATALOG NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

MATERIALS HANDLING

1—Lift Trucks. Here's an 8-page booklet (Index No. 54.00) that describes powered lift trucks for use in areas of Class 1, Group D, explosion hazards. Explains explosion-proof construction. Diagrams, photos. Revolvator Co.

2—Slings and Fittings. This 40-page revised handbook (SL-No. 3) includes new reference information condensed into chart form on sling types, dimensions, weights, and rated loads. Photos show applications. Union Wire Rope Corp.

3—Tube-Veyor. Bulletin TV-80 is an illustrated 20-pager that describes totally enclosed bulk materials handling conveyor with a two directional chain to convey in any direction. Handles any free flow material. Prab Conveyors, Inc.

4—Palletainers. Standard hi-lode, warehouse, bulk-lode, and bearing plate models for all handling operations are discussed in this 18-pager (Form 120). Union Steel Products Co.

5—Sling Chains. Useful features of the 1, 2, 3, and 4 leg styles with sling hooks, grab hooks, and foundry type hooks are described in 8-page bulletin (DH39). Discusses safety and strength factors. American Chain & Cable Co.

6—Fork Lift Trucks. This 4-page folder tells about lift trucks for use in areas where added safeguards are needed for fuel, electrical, and exhaust systems. Covers mechanical and electrical components. Other info. Towmotor Corp.

7—Materials Handling Equipment. "Everything that hangs from the crane hook" is described and illustrated in this 24-page catalog. Includes coil weight calculation charts, capacity tables, drawings, and photos. Heppenstall Co.

8—Hoists. Catalog No. ADH-65 (12 pages) has details about new lightweight, easily portable coil chain electric hoist. Models range from ¼ ton to 2 tons in capacity with two lifting speeds available in each size. Duff-Norton Co.

9—Load Handling Equipment. Corrugated steel boxes, skids and pallets for unit load handling are described in Catalog No. 90, 16 pages. Includes info to help speed production, solve handling problems. The Union Metal Mfg. Co.

10—Tractor Shovel. Bulletin No. 5255 (20 pages) discusses the fully automatic torque transmission, safety curve arms and 45-deg. bucket tip back of model Y18 shovel. Has maintenance info, photos. Yale & Towne Mfg. Co.

11—Speed Trucks. Two 4-pagers describe and illustrate these trucks: Bulletin ET2 covers model E1900, called the "low-bed" electric. Bulletin ST6, truck models 2500 and 2500LW, and a tractor for congested areas. Kalamazoo Mfg. Co.

12—Belt Idler. Here's an 8-page bulletin (No. 925) that tells about the development and performance of these idlers. "Secret" of their satisfactory results is the double flexible diaphragm seals. The Jeffrey Mfg. Co.

13—Lift Truck Attachments. This 48-pager (No. 585) lists attachments for mechanical and lift trucks. Shows 26 ways to get more use from trucks. Photos. Little Giant Products, Inc.

BUILDING AND EQUIPMENT

14—Fiberglas Insulations. Here's a 12-page catalog (1-GC-134) that discusses flexible and rigid metal building insulations. Gives info on heat losses, condensation, etc.; technical tables, photos, graph. Owens-Corning Fiberglas Corp.

15—Expansion Joints. This 80-page catalog gives info for rating expansion joints subjected to axial or lateral movement, angular rotation, or combinations of these movements. Provides formulas, other engineering data. Badger Mfg. Co.

16—Precast Concrete Floor, Roof. Illustrated 8-pager (Form L1, revised) explains advantages of this modern system. Said to save on-the-job labor and job time. Includes design data, specs, detail drawings. The Flexicore Co., Inc.

17—Roofing, Skylights, Doors. Three catalogs with specs and photos tell all about these products: No. 8b, 16 pages, roofing and skylights; 16a, 12-pager, stainless steel entrance units; 16b, 20 pages, doors, frames. Overly Mfg. Co.

18—Duct Joint Seals. A 4-page folder titled "Durable Seal for Duct Insulation Joints" offers time-saving ideas for making neat permanent seals. Diagrams and photos show how pressure-sensitive tape lowers costs. Johns-Manville.

19—Fire Protection Equipment. Catalog No. 571, "Industrial Fire Equipment," (22 pages) lists fire extinguishers, hoses, accessories, safety equipment, other fire apparatus. American LaFrance Corp.

MATERIALS

20—Tapes, Refinishers, Adhesives. Here's a 16-page condensed data book that describes pressure-sensitive tapes, metal foils and laminates, Teflon, silicone and refinishing products, and adhesives. Permacel-LePage's Inc.

21—Balsa Core Panels. Technical File folder gives construction details and technical data on Belcobalsa Gridkore. The precut hollow cell core is grooved to provide tight fitting joints for fast assembly. Balsa Ecuador Lumber Corp.

22—Polyethylene. Here's a 16-page booklet that points out advantages of this resin as a packaging material. Also describes its use in coatings, films, and moldings. U.S. Industrial Chemicals Co.

23—Refractory Brick. This 24-page booklet, "Refractory Brick and Other Shapes for Industry" (Form 862) gives technical data to aid operators select proper refractory products for high-temperature applications. Norton Co.

24—Plastic Steel. Bulletin NI-103 is a 12-pager that describes plastic steel and other products for metal-working, plastics, other industries. Contains info on chemical and physical properties, case history applications. Devcon Corp.

PRODUCTION

25—Vertical Profiler, Positioner. Two bulletins: SL9 (12 pages) describes tracer control for automatic 360-deg. profiling. No. 619 (24 pages) has info on precise circular spacing, positioning. Photos. Pratt & Whitney Co.

26—Woodworking Machines. This large-size 16-page booklet (Form 1222) outlines preparation, methods, and increased production with these sanding machines. Table of coated abrasives, diagrams, application photos. Behr-Manning Co.

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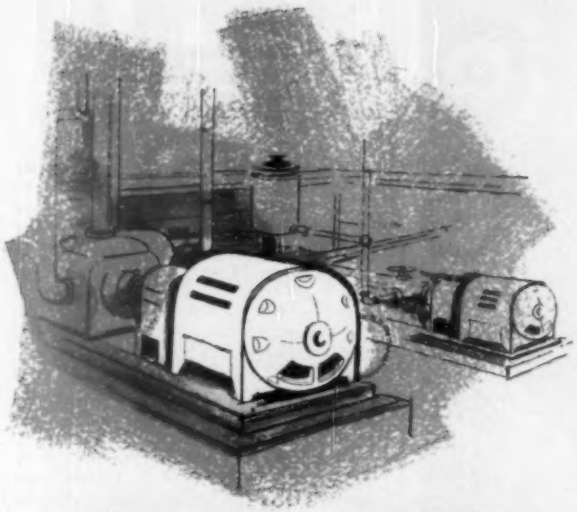
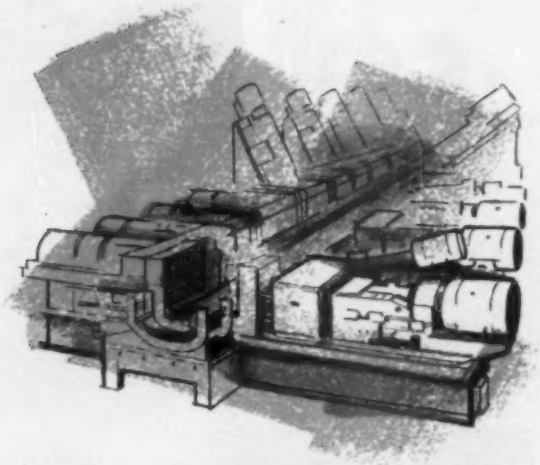
OTHER CATALOGS

Valves, Pipes, and Fittings ..... p. 220
Heating and Air Conditioning ... p. 222
Maintenance ..... p. 222
Mechanical ..... p. 224
Instruments and Controls ..... p. 224
Auxiliary ..... p. 226
Electrical ..... p. 226
Miscellaneous ..... p. 228



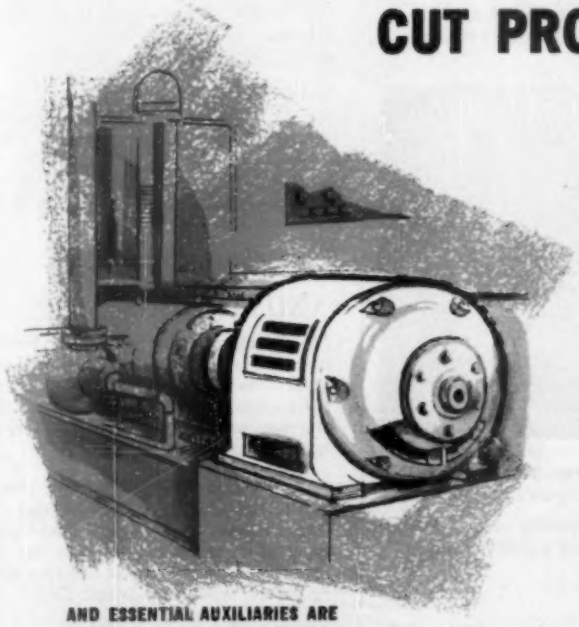
FLUID PROCESSING EQUIPMENT STAYS "ON STREAM"



SILICONE-INSULATED MOTORS KEEP PRODUCTION GOING DESPITE OVERLOADS

HERE'S WHY...

SILICONE INSULATED MOTORS CUT PRODUCTION DOWNTIME



AND ESSENTIAL AUXILIARIES ARE UNAFFECTED BY HIGH AMBIENT TEMPERATURES, MOISTURE, OVERLOADS

Whenever downtime is measured in lost profits, it pays to specify motors insulated with silicones. These motors . . . with extra service factor built in . . . keep production moving even when overloaded as much as 50 percent.

That's because they are designed to let the extra thermal capacity of Dow Corning Silicones carry overloads well above normal rating.

And they operate more efficiently. For example, in one case an exhaust fan requires only 40 horsepower except for the first half-hour of operation when colder, heavier air boosts the load to 60 hp. A silicone insulated 40 hp, 1.50 service factor motor was installed and operates at top efficiency on normal load, handles the half-hour overload with ease.

When you specify service factor motors, there's no need to overmotor for occasional overloads. Excessive power bills resulting from part load inefficiencies are eliminated. What's more, silicone insulated motors withstand high ambients, moisture, some corrosive atmospheres and hazards that cause other motors to fail.

Silicone insulated service factor motors are available from several leading manufacturers . . . and many of the advantages of service factor motors are available from motors that have been rewound with Dow Corning Silicones.

Send for your copy of a new booklet detailing the advantages of silicone insulated equipment.

Specify DOW CORNING SILICONES and *Save*

first in silicones

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MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS DETROIT LOS ANGELES NEW YORK WASHINGTON, D. C.

For more facts circle 593 on Reader Service Card

NEWS ABOUT MACHINE MOUNTS

Unisorb offers three cost-saving benefits for installing machines and equipment . . . Legs or framework can be solidly secured to the floor without bolts or lag screws; No danger of machines "walking"; and Up to 85% of transmitted vibration is absorbed.

Precision machines need a special type Unisorb mounting. Centerless Grinder, left, was installed quickly, without bolts or lag screws. Milling machine, right, is mounted on Unisorb LEVEL-RITE MOUNTS for quick, precise level.

Every machine has a vibration "personality". Different machines require different densities. Only Unisorb provides the right density and thickness.

TRY UNISORB ON OUR TRIAL OFFER! Let us send you the right density and thickness for a specific machine. If you're not satisfied, return within 30 days and we'll cancel the invoice. Write or call, today.

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FACTORY / CATALOG NEWS

Begins on page 218

For more about these items, circle item numbers on Reader Service Card next to back cover.

27—Torch. Bulletin No. 6-1 (4 pages) calls it "the money-saving answer to metal removal problems." Applications include tank fabrication, foundry casting cleaning, cutting cast iron, welding without pre-beveling. Arcair Co.

28—Vacuum Processing. Bulletin No. 1-2 (28 pages) explains the advantages and mechanics of dielectric heating, vapor stream degassing, and tower drying and degassing of impregnants. Graphs. NRC Equipment Corp.

29—Dryer Blender. How this basic glassed-steel conical dryer blender can impregnate, concentrate, react, or coat in a single operation is described in Bulletin No. 963 (4 pages). Lists specs, operation data, sizes. The Pfaudler Co.

30—Multiple Rotary Slitting Lines. Spiral-bound 78-page handbook (Form 700, 6th ed.) covers slitting lines for coils and sheets. Part I gives selection and operation data, time studies; Part II, specs, capacity tables. The Yoder Co.

31—Precision Tools, Machining. Catalog 55-FL is a 36-pager that describes shaft tools, grinders, drill heads, drilling units, accessories. Catalog VM-57 (28 pages) covers portable precision machining tool applications. The Dumore Co.

VALVES, PIPES AND FITTINGS

32—Couplings. New descriptive bulletin (spiral-bound, 26 pages) tells all about quick-connect, quick-disconnect couplings. Includes construction details, flow and pressure drop data, cutaway drawings, photos. Snap-Tite, Inc.

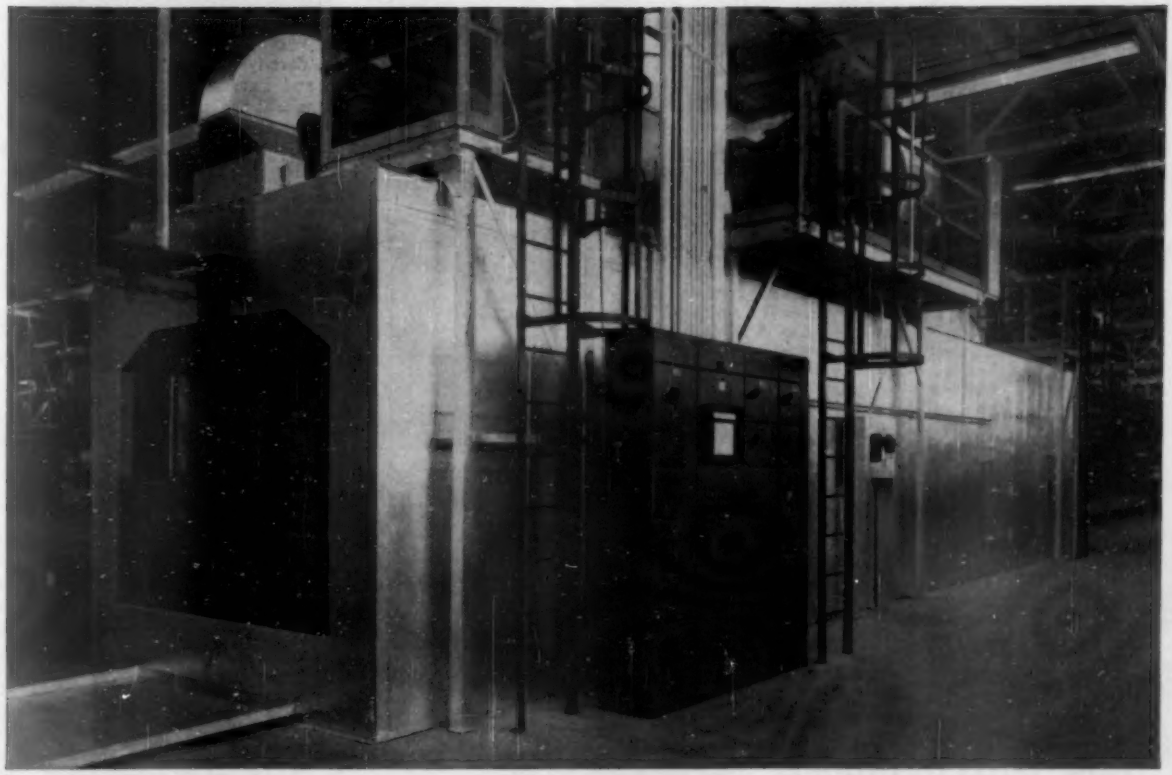
33—Corrosion-Resistant Valves. Here's a 12-page illustrated booklet that discusses valves and accessories, and various types of valve operations. Also has info about other bulletins that describe specific valves. Automatic Switch Co.

34—Automatic Valves. There are 212 valves—19 are entirely new—described in condensed Catalog P&H-58 (12 pages). Includes specs to help with selection of valves, tables of pipe sizes, ratings, and shipping weights. Cash-Acme.

35—Butterfly Valves. Advantages, dimensions, technical characteristics of these rubber-seated valves are given in illustrated Bulletin No. 650-R2 (4 pages). Features a handy sizing nomograph. Builders-Providence, Inc.

36—Hydraulic Tube Fittings. Catalog No. 556, 28 pages, has three easy-to-use sections covering self-flaring, no-

FINISHING SYSTEMS...



MODERN PRODUCTION FINISHING METHODS Require ULTRAMODERN FINISHING EQUIPMENT!

The function of the modern Dry-Off Oven, pictured above, is to thoroughly dry metal parts after passing through the Cleaning and Rust Proofing Machine in a Complete Mahon Finishing System installed in an Automobile parts plant.

When you have a finishing problem, you, too, will want to discuss methods, equipment requirements and possible production layouts with Mahon engineers . . . you'll find them better qualified to advise you, and better qualified to do the initial planning and engineering which is so vital to a properly coordinated production finishing system.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

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Engineers and Manufacturers of Complete Conveyorized Finishing Systems; Metal Parts Washers, Metal Cleaning and Rust Proofing Machines, Conveyorized Cleaning and Pickling Machines; Dry-Off Ovens, Cooling Tunnels, Spray Booths, Electrostatic Spray Enclosures, Flow Coaters, Dip Coaters, Finish Baking Ovens, and Paint Stripping Equipment; Core Ovens, Soldering Ovens, Heat Treating and Quenching Equipment for Aluminum and Magnesium; Dust and Fume Control Installations, and Many Other Units of Special Plant and Production Processing Equipment.

See Sweet's Plant Engineering File for Information and Representative Installations, or Write for Catalogue A-658

. . . the EXPERIENCE that goes into the PLANNING and ENGINEERING of MAHON EQUIPMENT is the item of GREATEST VALUE to YOU!

MAHON

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EXTRA

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We don't make pop-up toasters or television sets—our business is Semiconductor Power Conversion Equipment and Systems. This intense specialization assures you of the best rectifier equipment it is possible to build—plus the flexibility of modifying designs to meet specific, exacting requirements. Such valuable EXTRAS are evident in every Sel-Rex Rectifier installation. Send for FREE "GUIDE" to Industrial Rectifier Equipment.

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"Complete Semiconductor Power Conversion Systems for any AC to DC application."

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This Self-Contained Fluid Cooling System ...gives most accurate temperature control

Applied in cooling industrial machines or processes to temperatures approaching the ambient wet-bulb, the NIAGARA *Aero* HEAT EXCHANGER is independent of any more than a nominal water supply or disposal. The coolant system is a closed one, free from dirt and maintenance troubles.

Heat is removed from your process *at the rate of input*, giving you precisely the temperature you require and assuring the quality of your product. Heat may be added to prevent freezing in winter or for better control in a warm-up period. Liquids or gases are cooled with equal effectiveness.

Heat is rejected outdoors. Only the little water evaporated on the cooling coils in the air stream, or discharged to prevent hardness build-up, is consumed.

Niagara sectional construction saves you much installation and upkeep expense, gives full access to all interior parts and piping. Your equipment always gives you full capacity and "new plant" efficiency.

Write for Niagara Bulletin No. 132 for complete information

NIAGARA BLOWER COMPANY

Dept. F-9, 405 Lexington Ave., New York 17, N.Y.

District Engineers in Principal Cities of U. S. and Canada

FACTORY / CATALOG NEWS

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For more about these items, circle item numbers on Reader Service Card next to back cover.

flare, flare-type fittings. Has info on design and installation of each type, plus dimensional specs. Flodar Corp.

37—Valves. This 24-pager No. V-58 illustrates and lists specifications of magnetic and motorized valves for use with air, water, gas, steam, oil, and refrigerants. Solenoid coil rating tables, two flow charts. The Mercoid Corp.

HEATING AND AIR CONDITIONING

38—Air Conditioning Units. Bulletin No. 786 (54 pages) describes new product—Roll-O-Vent automatic air filter. Info on operation, performance, selection of basic unit and components. Illustrated. American Air Filter Co., Inc.

39—Steam, Hot Water Heaters. Three unit heater types—horizontal, vertical, and "power-throw"—are discussed in illustrated Catalog No. 158 (28 pages). Bulletin 158B (4 pages) tells when to "Repair or Replace." Modine Mfg. Co.

40—Air Handling. "Westinghouse Puts Air to Work" is an illustrated 28-page booklet (D-5199) that covers treatment and distribution of air, and products for the job. Info on applications; other data. Westinghouse Sturtevant Div.

41—Heaters, Air Conditioners. Two bulletins: No. 286 (8 pages) on automatic heaters gives specs on 10 new units from 25,000 to 250,000 Btu./hr. No. 2800 (4 pages) covers self-contained air conditioners. Ilg Electric Ventilating Co.

MAINTENANCE

42—Metal Cutting Band Saws. Here's an 8-page catalog that illustrates and describes all of company's band saw models. Contains detailed info, specs, in-use photos, as well as stock stands and accessories. Johnson Mfg. Corp.

43—Scrubbers, Polishers. One 4-pager, a 6-pager and two single-pagers (all illustrated) tell about floor machines. Give info on 11 heavy-duty scrubbers, polishers, transferable vacuum models, and cleaners. Hild Floor Machine Co., Inc.

44—Rolling Scaffold Towers. Bulletin No. 66 is an illustrated 4-pager that explains applications of scaffolds used as rolling towers and work staging in and out of doors. Includes component parts, photos, drawings. Beaver-Advance Corp.

45—Pipe Rotator. Rotators for welding and flame-cutting pipe are described in illustrated 4-pager ("Peck Jr."). One

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For more facts circle 598 on Reader Service Card ►

"Good riddance to remnant loss" with Asarcon 773 bearing bronze. No more scrap ends from short cast bars. Buy Asarcon 773 (SAE 660) in just the length you need for a specific job; or buy and stock the sizes you commonly use in the lengths which fit your everyday needs best. Asarcon® continuous-cast bearing bronze comes in 260 stock sizes, solids and tubes, in lengths up to 105". For nearest stock point, write Continuous-Cast Products Department, American Smelting and Refining Company, Barber, N. J. West Coast Sales Agent: Kingwell Bros., Ltd., 457 Minna St., San Francisco. In Canada: Federated Metals Canada, Ltd., Montreal and Toronto.

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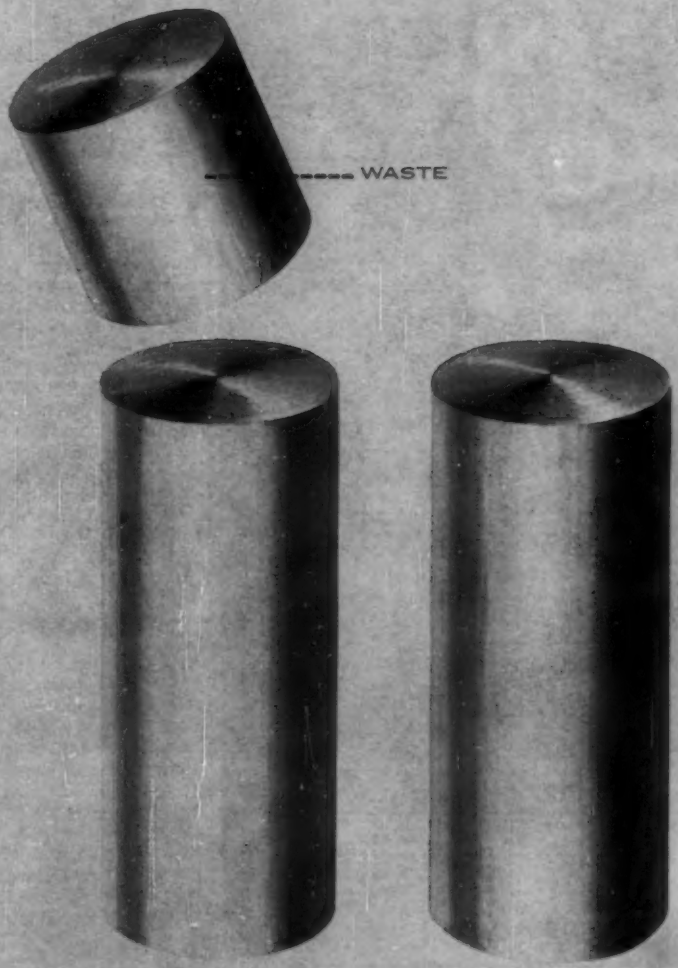

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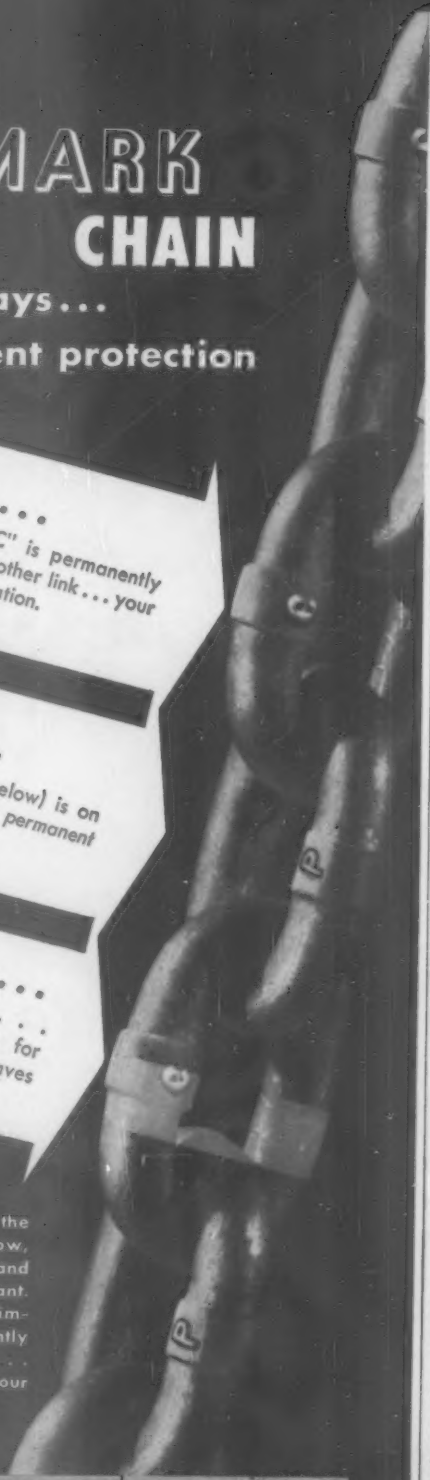

1 BY MAKE...
The Campbell "C" is permanently in relief on every other link... your Campbell identification.

2 BY GRADE...
the grade mark (see below) is on every other link... your permanent grade identification.

3 BY 5′ INTERVALS...
Campbell "Measure-Mark"... color-coded every five feet for quick, exact measurement... saves time.

From now on when you specify any of the four grades of Campbell Chain listed below, you'll always know the make, grade and length of every piece of chain in your plant. The *grade* and *make*—your two most important safety gauges—are permanently recorded where you need them most... right on the chain itself! Contact your distributor or write direct for details.

CODE SPECIFICATIONS

GRADE	PERMANENT GRADE MARK	COLOR-CODE "MEASURE-MARK"
Proof Coil Chain	P	Green
BBB Chain	B	Red
High Test Steel	H	Blue
Cam-Alloy Chain	A	Orange

CAMPBELL CHAIN

CAMPBELL CHAIN *Company*

York, Pa.—W. Burlington, Iowa
E. Cambridge, Mass., Chicago, Ill., Portland, Ore., Seattle, Wash.
Los Angeles, Sacramento, San Francisco, Calif.
Makers of Jiffy Lug-Reinforced Tire Chains and Blue Tamper pre-cut, packaged chain

FACTORY / CATALOG NEWS

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For more about these items, circle item numbers on Reader Service Card next to back cover.

model, for pipe up to 5-in. diameter, is portable; another is heavy duty for pipe up to 36-in. Cecil C. Peck Co.

46—Conduit Bending. Here's an 8-page manual, "Making Conduit Bends That Fit," that gives steps in fitting rigid conduit to a job by producing exact stub lengths, back-to-back bends, others. Diagrams, sketches. Steelduct Co.

47—Wire Rope Splicing. This 36-page illustrated handbook explains techniques of splicing—eye, endless, eight-strand, etc. Includes info on grommets, socketing of ferrules, efficiencies of wire rope attachments. Union Wire Rope Corp.

48—Magnesium Anodes. Two 4-pagers discuss use of anodes for the prevention of corrosion in hot water tanks. PV-C-420R covers anode replacements for domestic water heaters; PV-C423, anodes for tanks, generators. Patrol Valve Co.

MECHANICAL

49—Speed Reducers. Catalog B7238 is a 16-pager that discusses selection, hp. rating, installation of shaft-mounted speed reducing units. Gives dimensions, photos. Westinghouse Electric Corp.

50—Flexible Drive Couplings. Here's an illustrated 4-page catalog describing press-on type couplings and interchangeable hub designs. Made of magnesium alloy; available for shaft sizes ⅜ to 6 in. Detroit Power Coupling Co.

51—Speed Control Systems. Operation and application of variable speed drive and pneumatic control systems are shown in 8-pager (No. F1882). Includes info on pre-engineered instrumentation packages. U.S. Electrical Motors Inc.

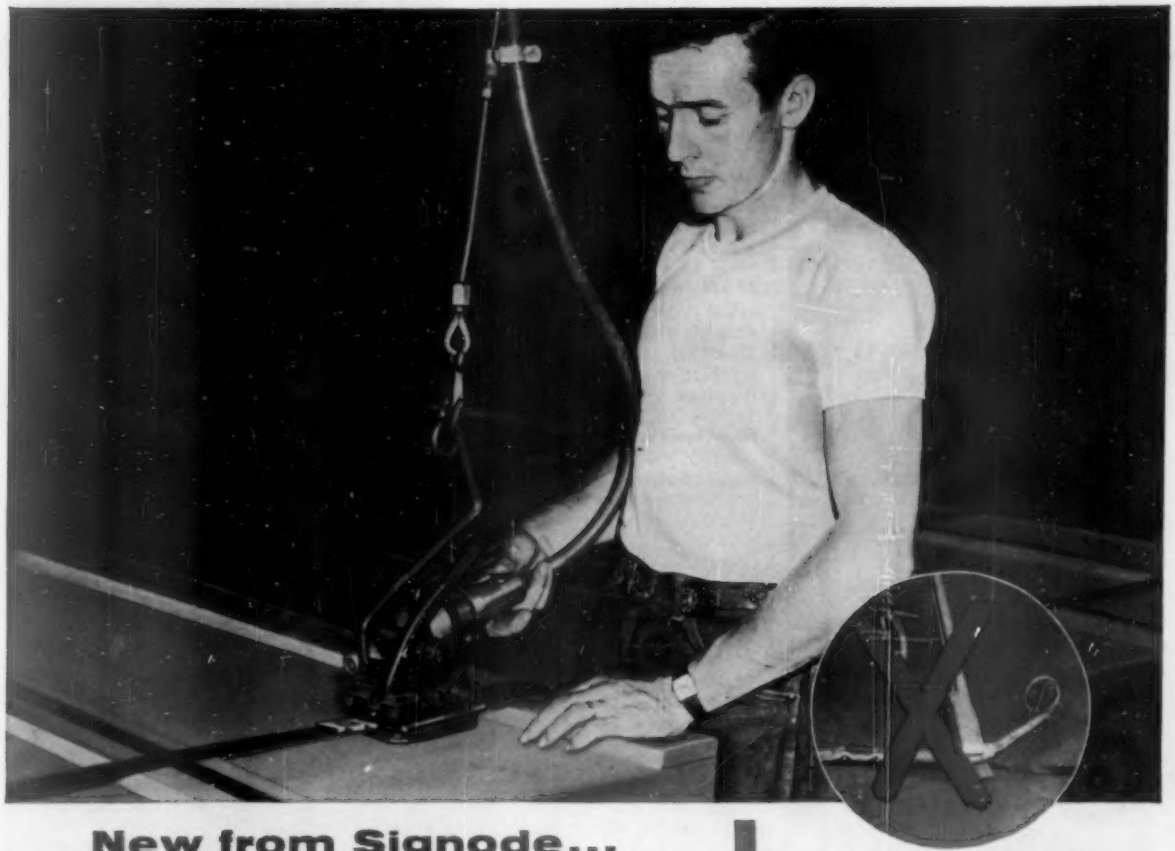
INSTRUMENTS AND CONTROLS

52—Recording Annunciators. Bulletin No. 102 (4 pages) describes new model that records without complicated decoding off-normal and on-off operations. Said to reduce operation costs, downtime, and maintenance. Photos. Panellit, Inc.

53—Crane Scale. This 4-page bulletin (M-33) contains facts about a versatile hydraulic crane scale that eliminates need for central weighing station, saves time and labor. Gives specs, application photos. Martin Decker Corp.

54—Flowmeters. Here's a 15-page catalog (10A9010) that gives engineering data for tri-flat variable-area flowmeters.

Turn the page



No wasted pigtail of strapping from a windlass type tool.

New from Signode... Saves a Foot of Strap Every Time It's Used!

Here is the first feed wheel heavy-duty tensioning tool!

The FN-114 is air powered...takes 1¼-inch strapping directly from the dispenser and cuts it after tensioning. No waste strap.

- Can save a foot or more of strap every time it's used.
- Easier and faster to load and use than a windlass type tool.
- Air power does the tensioning. A quick stroke of the handle severs the strap and disengages the tool.
- Unlimited take-up...pulls to pre-set tension every time.
- Plenty of power—from 1500 to over 3000 pounds tension, depending on air pressure setting.
- Thoroughly field tested in over eight months of actual use.

The FN-114 is a tough, rugged 20-pound tool. Next to the time it saves, its most important advantage to most users is the fact that it eliminates waste in the curl of strap which until now has been a necessary evil in applying 1¼-inch strapping with windlass type tools.

The FN-114 stretcher—like other Signode heavy-duty tools—is available on a choice of arrangements that minimize your capital investment. Let us arrange a demonstration on your premises at your convenience. Just write or call. No obligation.

114-OF Seal

New 1¼-inch Seal—slips over strapping just before tensioning. This seal or regular thread-on seal can be lithographed with your company name, trademark, and colors.

New DA-114 "Cobra" Heavy Duty Dispenser—floor type dispenser has low inertia for easy pulling with little overrun. Easy to load (floor level). Feeds strap at convenient waist height in almost any direction.

DA-114 Cobra Dispenser

RCN-1435 Sealer

Heavy Duty Air-power Sealer applies 1¼-inch seals quickly and easily at the push of a button, with maximum security. Make this power sealer part of your strapping set-up with the FN-114 for maximum savings.

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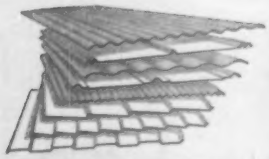

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ADDRESS_____
CITY_____
ZONE_____ STATE_____

FACTORY / CATALOG NEWS

Begins on page 218

For more about these items, circle item numbers on Reader Service Card next to back cover.

Includes float characteristic curve, calibration charts, application notes, diagrams. Fischer & Porter Co.

55—Volt-Ammeter-Ohmmeter. What is called the world's only snap-around volt-ammeter-ohmmeter is shown in 4-page illustrated Catalog A583. Gives model numbers, specs, applications, dimensional drawings. Pyramid Instrument Corp.

56—Liquid Level Control. Two types of controls, electronic and electromagnetic, to assure efficient operation and flexibility, are described in Bulletin PF571 (16 pages). Electronics Corp. of America.

AUXILIARY

57—Steam Generator. Useful features of this 2-drum water walled generator fired by oil, gas, or coal are listed in illustrated Catalog SB57E (20 pages). Gives data on 2-drum factory-built or field-erected units. Erie City Iron Works.

58—Pumps. Catalog No. 100 (12 pages) contains info on internal gear, sliding vane, spur external gear pumps, and fluid motors; also relief valves in sizes from ⅜ to 1½ in. Provides selection guide chart, photos. Tuthill Pump Co.

59—Cycloidal Blowers. Bulletin VP-158 (12 pages) describes cycloidal blowers for vacuum service. Includes construction, capacity, and ratings data. cutaway view of blower, characteristic curves for units. Roots-Connersville Blower.

60—Steam Generators. This 4-pager (Form SG761) describes flash-type 30 boiler-hp. generator composed of two 15 boiler-hp. heater coils and two burners with individual controls. Photos. Malsbary Mfg. Co.

ELECTRICAL

61—Transformers. This 20-pager (GEC-1600) is an easy-to-read guide for specifying dry-type transformers for building applications. Pictorial index, dimension tables. General Electric Co.

62—Wire, Cable Insulation. "Handbook of Butyl Insulation" is a 28-page booklet (Form No. 688) on rubber insulating material. Contains basic data such as cable size and capacity, photos, charts. National Electric Products Corp.

63—Raceways, Fittings, Lighting. Pocket-size, 144-page wiring guide (No. 21) covers surface metal raceways and fittings, multi-outlet systems, fluorescent equipment, non-metallic flexible conduit. Photos, installation info. Wiremold Co.

Turn the page

FOR CLEAN · SAFE ECONOMICAL FLOOR MAINTENANCE
GO FLORCO

Hazardous conditions (under foot) created through circumstances beyond control in today's high production cycle in your plant — *Are dollar-dangerous!*

An ounce of preventative maintenance outweighs dollars lost through accident to employees, damage to your equipment and non-productive down-time.

Florco is selectively mined and processed to give the most effective and economical all-purpose adsorbent available.

For the safest and best housekeeping service in your production line without costly applicators or removal equipment,

GO FLORCO® AND SAVE!

Florco is easy and convenient to use:

- Cover area to be treated with a thin layer of Florco—and let set for a few moments.
- Sweep it up—the floor is clean and the hazardous slippery area is eliminated.

SEND TODAY for free demonstrative sample and descriptive pamphlet on Florco. Just enclose this ad with your signed business letterhead.

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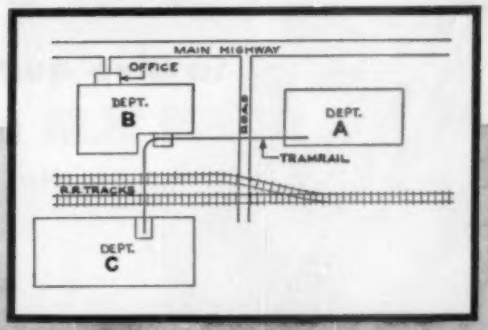
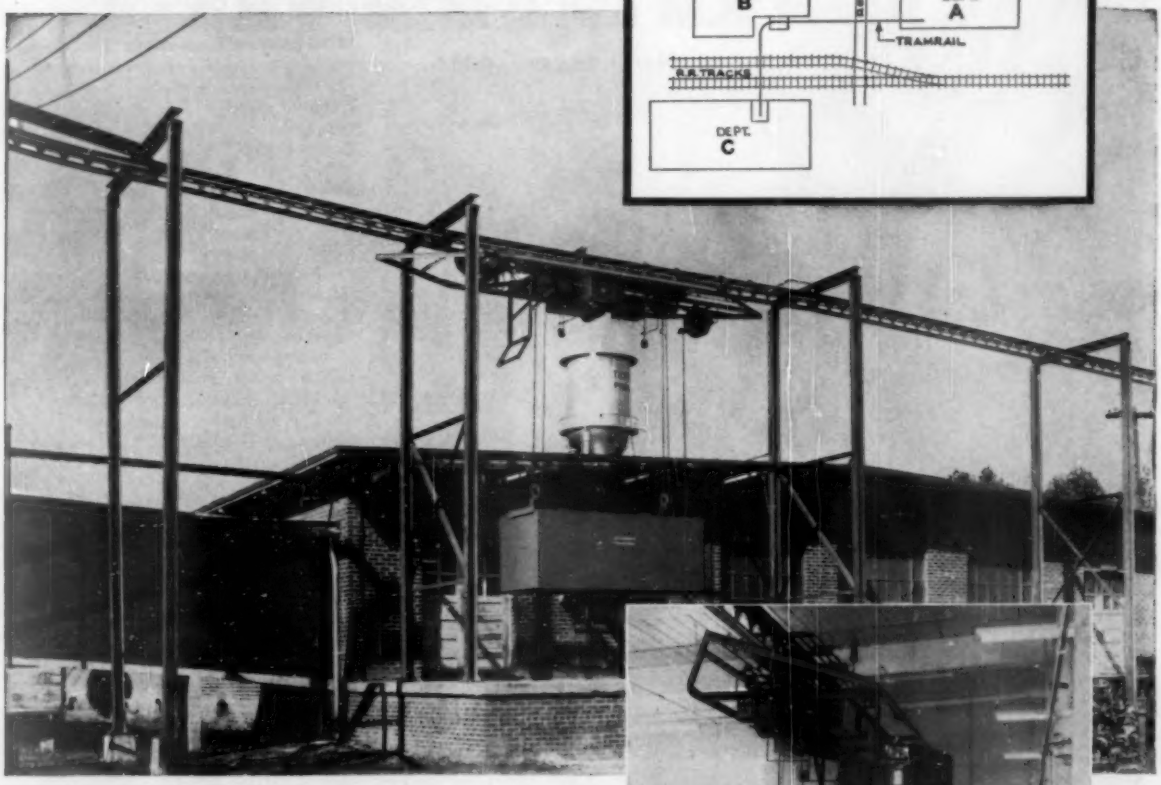
ADSORBENTS
Dept. P, P.O. Box 989 Tallahassee, Florida

Automatic Handling Between Three Buildings

Operation Costs Plunge Because of Time Saved



Photograph shows van being lowered to outside dock. It remains here until unloaded or loaded and dispatched.

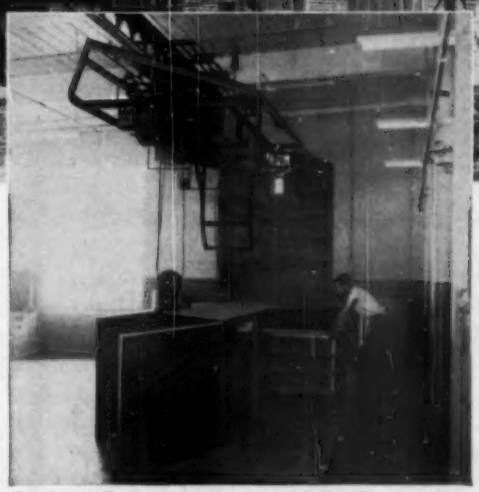


AN automatic Cleveland Tramrail materials handling system operates over a street and railroad to serve three separate buildings. It carries materials back and forth between the plants without need of especially assigned operators. The dispatching of materials is easily handled by men in the buildings along with their other work, since it is only necessary to press a push button to send a Tramrail carrier on its way.

The Tramrail carrier travels up and down grades because the buildings are at different elevations. When it reaches its destination, it lowers at once, automatically. A warning bell sounds as it descends.

Because of the time savings and elimination of need of many powered floor trucks and their expensive maintenance, cost of handling materials between the buildings is very low.

Cleveland Tramrail has engineered a wide variety of automatic materials handling systems. We stand ready to share with you the benefit of our experience.



Loading a Tramrail carrier van with four floor trucks. Each has a load of 250 lbs. Depressing the proper button on the wall sends the van to either of the other two buildings.

Write for free "Automatic Handling" booklet.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 3236 E. 290 ST. • WICKLIFFE, OHIO

T-J spacemaker cylinder

Quality Engineered

to give quality results

with Extras . . .
at No Extra Cost!

You get more—much more—when you specify and use any of T-J's complete line of Spacemaker cylinders. The Spacemaker is engineered to give you better, more accurate, and longer service—offers, exclusively, many extras . . . that are STANDARD, AT NO EXTRA COST!

Designed to eliminate tie-rods, providing greater strength . . . saves space . . . reduces manhours and costs in all push-pull-lift operations. OFF SHELF DELIVERY in a wide range of styles and capacities, with 64,000 combinations. Write for catalog SM 56-2 with complete engineering details. The Tomkins-Johnson Co., Jackson, Mich.

METAL PISTON ROD SCRAPER . . . Standard at No Extra Cost!

NEW "SUPER" CUSHION FOR AIR . . . Standard at No Extra Cost!

CHROME PLATED CYLINDER BORES AND PISTON RODS . . . Standard at No Extra Cost!

ONE PIECE PISTON . . . Standard at No Extra Cost!

NEW "SELF-ALIGNING" MASTER CUSHION FOR HYDRAULIC USE . . . Standard at No Extra Cost!

NO TIE-RODS TO STRETCH . . . Standard at No Extra Cost!

STREAMLINED DESIGN . . . Oil Pressure to 750 P.S.I.—air to 200 P.S.I. Standard at No Extra Cost!

FORGED SOLID STEEL HEADS . . . Standard at No Extra Cost!

T-J TOMKINS-JOHNSON
RIVETORS, AIR AND HYDRAULIC CYLINDERS, CUTTERS, CLINCHORS

FACTORY / CATALOG NEWS

Begins on page 218

For more about these items, circle item numbers on Reader Service Card next to back cover.

64—Silicone Insulating Components. Here is a 6-page selection guide (No. 10-109) that describes and illustrates procedures for winding electric motors. Brochure also lists materials and components. Dow Corning Corp.

65—Miniature Connectors. This 40-page, 4-color catalog (Form 20) is a newly revised source of electronic connector data. Includes specs, outline drawings, rating, dimension tables, and solder core info. DeJur-Amsco Corp.

66—RLM Standards. Here's the 1958 edition of the RLM Standard Specifications Book for industrial lighting units. New specs cover fluorescent units, incandescent reflector sizes. Simplified technical data. RLM Standards Institute.

67—Pancake Motors. Bulletin No. 2100 (4 pages) discusses enclosed motors that reduce motor length up to 60% over standard models. For roof-ventilating fans, other space-cramped applications. Ratings: 1 to 15 hp. Louis Allis Co.

MISCELLANEOUS

68—Job Time Recorder. Here's a 4-pager (Form 358) that tells how the calculagraph automatically computes and prints elapsed time from start to finish of a job. Shows totaled record form; photos of different models. Calculagraph Co.

69—Stainless Steel Wire. Analyses, mechanical properties, principal uses, laboratory corrosion data (in table form) are given in this 20-page manual. Includes round wire weights, standard gages, photos. Jones & Laughlin Steel Corp.

70—Fire Alarm, Phone Systems. Bulletin 131 is a 28-pager that describes basic components of fire alarm systems. Bulletin 133 has 20 pages on equipment for private telephone systems. Both illustrated. S. H. Couch Co., Inc.

71—Isolites. Radioisotope-excited light sources for signal systems and markers are described in 4-pager (No. 30.30). Lists general characteristics; other details. United States Radium Corp.

72—Odor Control. Illustrated catalog (4 pages) gives info about development of an odor-metering apparatus used in company's services—which are offered on all phases of air pollution. Lists other facilities. Hemeon Associates.

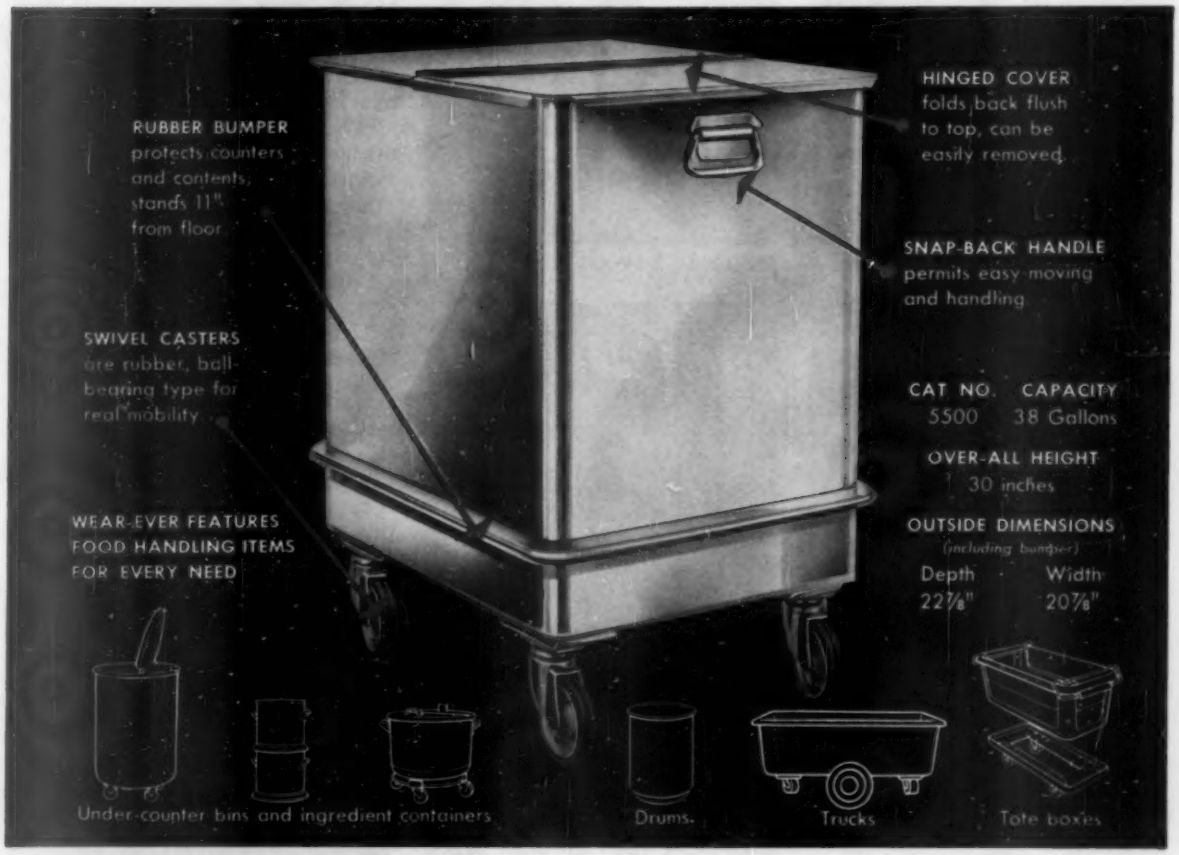
73—Sealer, Applicators, Bundler. A 4-pager covers motorized tape applicator for box sealing; two 6-pagers describe pad and flat surface applicators; another 6-pager tells about a combination bundler. Minnesota Mining & Mfg. Co.

33-1/3% more capacity . . . 24" and 30" heights

in this new rectangular, mobile under-counter type

BIN

by WEAR·EVER



We've "squared away" the conventional round container, to give you ⅓ *more* carrying and storing capacity, *in comparable over-all size.* Think what this can mean to you in faster handling, fewer refills, greater utility.

Quality's the same, of course, as in all Wear-Ever Aluminum food handling items. Extra hard-wrought dent and scratch resistant alloy. Seamless construction. Smoothly rounded, easy-to-clean inside corners. Sanitary flared rim.

Naturally, we've designed this new container for a perfect fit under your standard cook's and baker's work tables —same as the round type.

Like to see a sample? Pick up the phone and ask your Wear-Ever man to wheel one over. Or send coupon for full details on our complete food handling line.

WEAR·EVER ALUMINUM UTENSILS

WEAR-EVER ALUMINUM INC.
WEAR-EVER BLDG., NEW KENSINGTON, PENNSYLVANIA

Ask us about our special equipment to your specifications.

WEAR-EVER ALUMINUM INC.
6809 Wear-Ever Building, New Kensington, Pa.

GENTLEMEN: I'd like to know more about your new rectangular under-counter bin.

☐ Send me your catalog. ☐ Have your representative see me.

NAME.....

TITLE.....

Fill in, clip to your letterhead and mail today.

NEW ITEM! *Wear-Ever's new Metal Scouring Cloth. Won't scratch, won't mar, far outlasts ordinary scouring cloths. At your dealer's.*

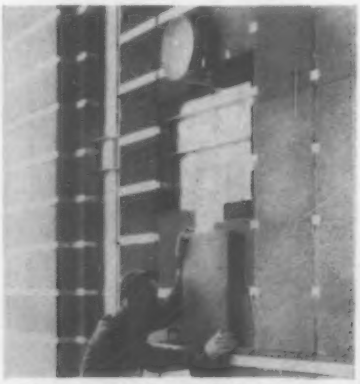
For more facts circle 605 on Reader Service Card

For more about these items, circle numbers on Reader Service Card next to back cover.

TORCH DOES NOT CRACK IT . . .

ACID WILL NOT AFFECT IT . . .

CUTTING IS EASY . . .



LIGHT WEIGHT HELPS SET-UP.

Now It's Foamed Silica

Pure silica when boiled and foamed turns into a new acid-resistant insulating and refractory material. Foamsil is 99% pure fused silica glass activated by a foaming agent that causes it to form millions of tiny, non-interconnecting bubbles. When cooled, the result is a lightweight, rigid inorganic block, with a closed cell structure.

The material will not oxidize or absorb moisture. It is unaffected by all acids except hydrofluoric and hot phosphoric. Offers continuous insulating protection, withstands thermal shock within the range of –450 to +2200 F. Insulating value of one inch of Foamsil is said to be equivalent to that of 18 inches of acid brick at an operating temperature of 250 F. Dimensional stability is excellent. Does not warp, shrink, or slump during rapid temperature changes. Does not crack or spall when subjected to intense heat (such as a steel-cutting oxyacetylene torch), and then water-quenched. Low density (10 to 12 lb. per cu. ft.) is said to reduce insulation weight as much as 90%.

Foamsil comes in 11x17-in. and 17x22-in. block sizes, in thicknesses up to 3 inches. Greater thicknesses may be obtained by laminating. Its many possible uses are in absorbing towers, acid filters, mixing and storage tanks, dipping vats, microwave absorbers.

Pittsburgh Corning Corp. (Circle 251, Reader Service Card.)

Another Man-Made Fiber for Textiles

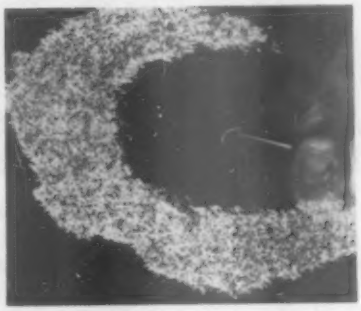
After nine years—a textile fiber that can be called an alloy!

This versatile acrylic alloy fiber, Zefran, was achieved after the manufacturer screened hundreds of polymers to find it. It was first made on improvised equipment, with fibers extruded through a hypodermic syringe into a water-filled tray. While the material is related to the acrylic family, it is considered different enough in composition to be called an alloy.

A special method for introducing a dye-receptive component gives flexibility in the choice of dyestuffs without sacrificing its physical properties. These include resistance to pilling, dimensional stability, a pleasant "hand," and a fresh appearance after long wear.

Blends of the new textile fiber with cotton, wool, rayon, and synthetics will be available soon.

Dow Chemical Co. (Circle 252, Reader Service Card.)



Aluminum Granules in New Sizes

Granular aluminum of controlled particle size and shape is a new metal product described as "bridging the gap between aluminum shot and aluminum powder."

This metal product offers a flexibility in alloys not previously available in finely divided aluminum particles. The long irregular shapes of

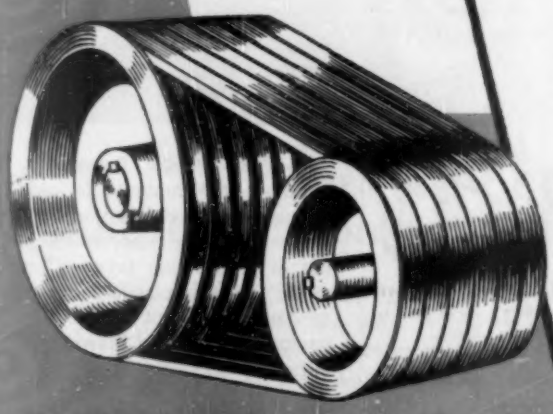
DA
DURKEE ATWOOD
SINCE 1910

V-belt **QUALITY** meeting industry's severest needs

Immediate **SERVICE** to solve customer's problems

Special attention to **CUSTOMER RELATIONS**

Emphasis on dollar **SAVINGS**



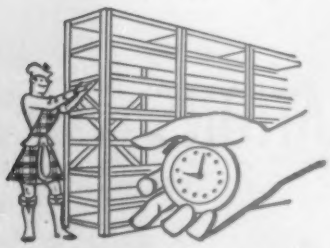
DURKEE ATWOOD V-BELTS

DURKEE-ATWOOD CO., Minneapolis 13, Minn.

get all the facts how

BORROUGHS STEEL SHELVING

will CUT your shelving costs!



saves erection time

Fewer parts . . . no fumbling with studs, tricky locks, bolts, nuts or lock washers

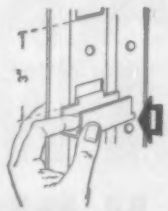
send for catalog!

saves time rearranging shelves

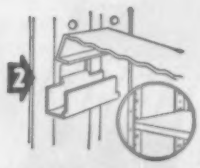
No lost motion . . . you can change a shelf in seconds

It's hot off the press! Revised 36-page illustrated catalog featuring Borroughs Steel Shelving. Send for your copy today.

First of all, Borroughs Steel Shelving is the most simple and most rapidly assembled steel shelving on the market. From the very start of its installation, it cuts your shelving costs. Except for the top shelf (2 bolts and 2 nuts), no other bolts or nuts are required for shelves. You need no special tools for assembly. Each individual unit is complete in itself . . . no part depends on unit next to it . . . any unit can be moved independently. Send for catalog and get all the facts.



Insert shelf support bracket . . no fumbling with studs, bolts, nuts or lock washers.



Tilt shelf into support bracket . . and shelf is ready for loading.

BORROUGHS MANUFACTURING COMPANY
OF KALAMAZOO

A SUBSIDIARY OF THE AMERICAN METAL PRODUCTS COMPANY OF DETROIT

3020 NORTH BURDICK ST. amp® KALAMAZOO, MICHIGAN

FACTORY / MATERIALS NEWS

Begins on page 230

For more about these items, circle item numbers on Reader Service Card next to back cover.

the new-type particles provide a greater surface area per unit of weight than does aluminum shot and, it is stated, at a much lower cost than aluminum powder. The granules now come in two standard sizes, 300-X (from 0.132- to 0.02-in. diameters) and 200-X (from 0.08- to 0.01-in.). A wide range of other sizes, between aluminum shot and aluminum powder, can be produced to meet specific needs. *Reynolds Metal Co.* (Circle 253, Reader Service Card.)

254—Adhesive Pack simplifies on-site mixing of epoxy resin adhesives for structural repairs. Pack includes epoxy adhesive in plastic bag, connected by plastic tubing to glass ampoule containing curing agent. When the glass is broken, agent runs into adhesive chamber. *Fenwal Inc.*

255—Self-Insulating Fasteners — screws, studs, rivets, nails—can be produced by a low-cost automatic process. Heads of varied thermoplastic materials (in desired colors) are molded on metal inserts, trimmed, and delivered ready to use. *Gries Reproducer Corp.*

256—Strip Coat dries in minutes and forms a white opaque film that can later be peeled easily from surfaces. Material contains no chlorinated solvents and has solid content of 30%. Used in paint spray booths for improving illumination. Can be sprayed or brushed on. *Magnus Chemical Co.*

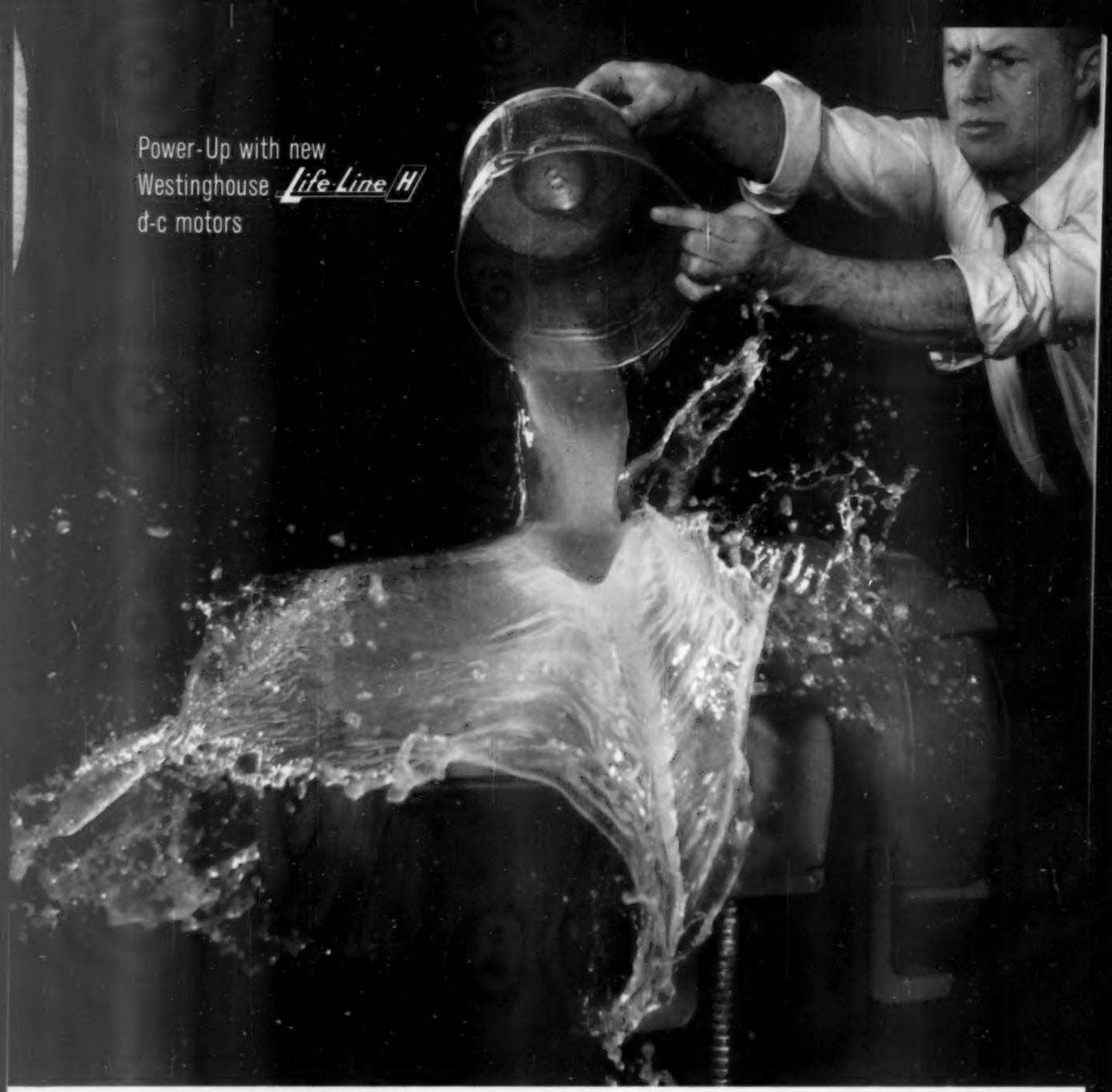
257—New Plastic Dispersant, for bonding new concrete to old, can be used also as a replacement for water in mixing concrete for patching or resurfacing floors. Concrete made with this plastic is water, oil, solvent proof; not affected by repeated freezing and thawing. *Acorn Paint & Chemical Co.*

258—Plastic Material that combines the best properties of rubber, nylon, and steel, is useful for such applications as handles for air hammers

Turn to page 236

For more facts circle 607 on Reader Service Card

For more facts circle 608 on Reader Service Card ➤



Greater protection . . . maximum reliability . . . longer, trouble-free life

HERE'S WHY: The rugged new Westinghouse Life-Line' "H" d-c motor gives you the most complete and advanced protection available in dripproof industrial d-c machines. Elimination of uncovered side openings . . . use of heavy, cast end brackets . . . effective seals throughout . . . all combine to provide outstanding resistance to liquids, vapors and dirt. For these reasons you can count on the Life-Line "H" to give you greater reliability with a minimum amount of maintenance under *all* operating conditions.

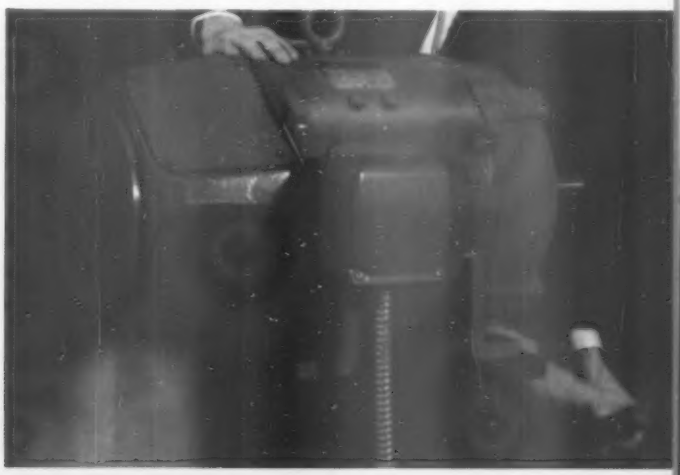
Plus . . . these other important advantages .....

YOU CAN BE SURE...IF IT'S Westinghouse

These exclusive features of the new Westinghouse Life-Line H d-c motor guarantee top performance . . . longer, trouble-free life

TEN TIMES LONGER INSULATION LIFE . . . New silicone insulation in Westinghouse Life-Line® "H" d-c motors and generators stands up under temperatures which turn ordinary insulation to a cinder. High-temperature silicone insulation is used with the full complement of iron and copper required for low Class B temperature. Result: Life-Line "H" shrugs off emergency overloads and abnormal ambients to keep production rolling, maintenance down.

CLEANER, COOLER OPERATION results from new controlled ventilation system of Life-Line "H." Ordinary d-c motors draw air in at commutator end, contaminate windings by drawing carbon dust from commutator brush wear *into* the machine. Life-Line "H" reverses this flow. Air and carbon dust are expelled at commutator end . . . assuring cleaner, cooler windings . . . longer motor life . . . less maintenance.



FASTEST RESPONSE . . . 35 per cent increase in commutating ability . . . up to 55 per cent lower mechanical inertia . . . and up to 30 per cent reduction in electrical inertia mean that the new Westinghouse Life-Line "H" d-c motor provides the fastest acceleration, quickest reversing and closest speed regulation. This means more production, better product quality, minimum complexity of control.

SIMPLIFIED MAINTENANCE . . . With the new Life-Line "H," maintenance is not only substantially reduced but periodic inspections are also greatly simplified. For example: as shown above, Uniforce brushholder fingers lock out . . . brushes can be inspected or changed with one hand. And Uniforce tension remains constant throughout brush life . . . no need to adjust pressure as brushes wear.

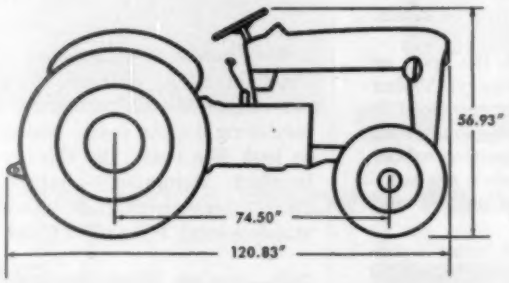
For information about the ways you can profitably put the new Life-Line "H" motor to work, contact your nearby Westinghouse representative. Or, write Westinghouse Electric Corporation, P. O. Box 868, 3 Gateway Center, Pittsburgh 30, Pa. J1-22121

YOU CAN BE SURE...IF IT'S Westinghouse

WHEN YOU NEED A TRACTOR...

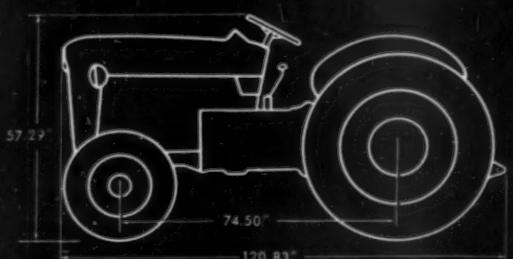
Just Check the "Specs" on FORD*

FORD MODEL 641 WORKMASTER



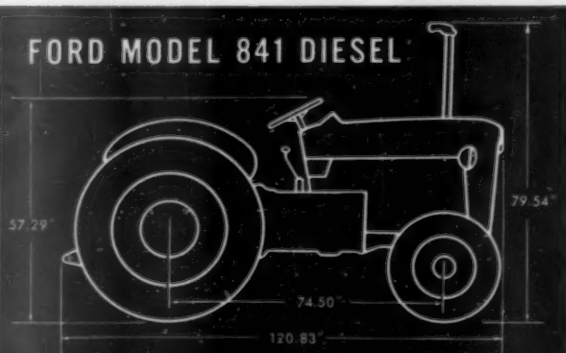
Belt H. P.	35.25 at 2000 engine RPM
Drawbar H. P.	30.73 at 2000 engine RPM
Tires (Additional tire options available)	11 x 28, rear, 5.50 x 16, front
Approx. shipping weight	2777 lbs.
Typical working weight (front and rear tire fill and wheel weights)	4771 lbs.

FORD MODEL 841 POWERMASTER



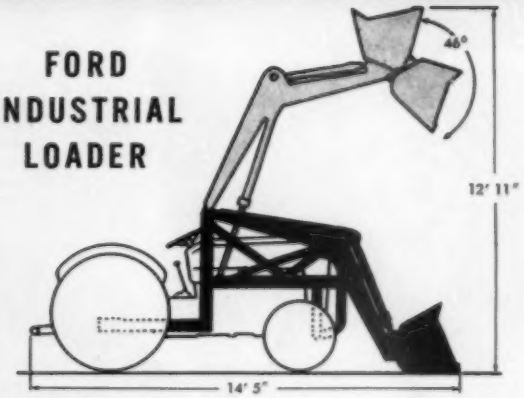
Belt H. P.	46.51 at 2000 engine RPM
Drawbar H. P.	42.12 at 2000 engine RPM
Tires (Additional tire options available)	12 x 28, rear, 6.00 x 16, front
Approx. shipping weight	2998 lbs.
Typical working weight (front and rear tire fill and wheel weights)	5480 lbs.

FORD MODEL 841 DIESEL



Belt H. P. (Manufacturer's rating)	37 at 2000 engine RPM
Drawbar H. P. (Manufacturer's rating)	34-35 at 2000 engine RPM
Tires (Additional tire options available)	12 x 28, rear, 6.00 x 16, front
Approx. shipping weight	4102 lbs.
Typical working weight (front and rear tire fill and wheel weights)	5584 lbs.

FORD INDUSTRIAL LOADER



Rated capacity	1000 lbs.
Breakaway capacity	2500 lbs.
Total cycle time	11 seconds
Lift (to bucket bottom)	10' 10"
Dump clearance (ground to bucket lip, dumped)	8' 6"
Reach (bumper to lip, dumped at full lift)	26"

*A folder of *detailed* specifications on Ford Tractors and equipment can be obtained from your Ford Tractor Dealer or by writing Industrial Sales Department, Tractor & Implement Division, Ford Motor Company, Birmingham, Michigan.

HANDLE ALL THESE JOBS AND MANY MORE . . . AT LESS COST!

YOU SEE MORE FORDS BECAUSE THEY SAVE MORE MONEY!

For more facts circle 609 on Reader Service Card

NOW...

PRINT YOUR OWN LABELS

FOR PRODUCT AND CONTENT IDENTIFICATION AS YOU NEED THEM!

No more label inventory. No more hunting for specific labels. No more reordering of labels. No more brush stenciling.

Instead print your labels on the spot, as needed – no special skill necessary! Weber Label Printing Machines print up to 105 labels a minute from either a rubber plate with quickly changeable pressure-sensitive rubber type or from a stencil drum. Labels are automatically counted, cut to size desired and stacked.

Lightweight and portable, the versatile machines can be moved within departments to speed up every multiple addressing and marking job.

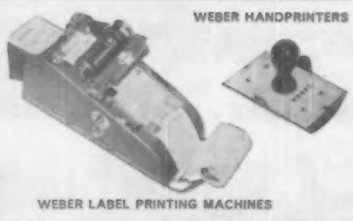
Hundreds of leading companies* in all industries are using Weber equipment to identify incoming and outgoing shipments, inventory, and parts in transit. They find that Weber Marking Systems solve the label problem and cut costs tremendously. Write today for complete information.

Send for free booklet

"How To Custom-Print Labels As You Need Them" tells how you can put Weber to use in your office. WEBER MARKING SYSTEMS, Division of Weber Addressing Machine Co., Inc., Mount Prospect, Illinois.

*Names furnished upon request.

Weber
MARKING SYSTEMS
ORIGINATORS OF "TOUCH-STENCILING"



FACTORY / MATERIALS NEWS

Begins on page 230

For more about these items, circle item numbers on Reader Service Card next to back cover.

and solid tires for heavy-load trucks. Material snaps back to original size after being stretched. *Mobay Chemical Co.*

259—Enameled Aluminum Tiles come in three different coatings: one enameled with permanent, nontarnishing copper color; one coated to look like brass; the third, called brushed aluminum, coated with clear, durable enamel resembling stainless steel. *Vikon Tile Corp.*

260—Asphalt Mastic-Mesh permits working in the rain on roof repairs. Designed for application in damp weather, Hydro-Shield two-part product consists of a pail of asphalt mastic that's combined on the job with rolls of glass fiber mesh reinforcement. *Labco, Inc.*

261—Four Epoxy Resins for varied casting, encapsulating, and potting use are applied as free-flowing liquid that hardens with little shrinkage on wood, metal, or plastic surfaces. Compounds cure rapidly, insulate well, are easily machined. *Raybestos-Manhattan, Inc.*

262—Scouring Pad and floor polishing pad can be used without conventional cleaning materials. Reduce time-per-job in wax stripping and dry buffing all types of floors. Pads are adaptable to all floor polishing and scrubbing machines. *Minnesota Mining & Mfg. Co.*

263—Sintered Tumbling Media for barrel finishing needs are available in a wide variety of shapes—including triangles, disks, and spurs—in a full range of sizes. These new materials can be used dry without the usual tumbling solutions. *Dixon Sintaloy, Inc.*

264—Concrete Softener for breaking pavement in a hurry is a complex nitrogen chemical called Chem-Break. It dissolves in cold water, without fumes. Just break concrete surface with jack hammer and pour it on. *L-R-V Chemical Co.*

Turn the page

more for your 'rack dollar' because

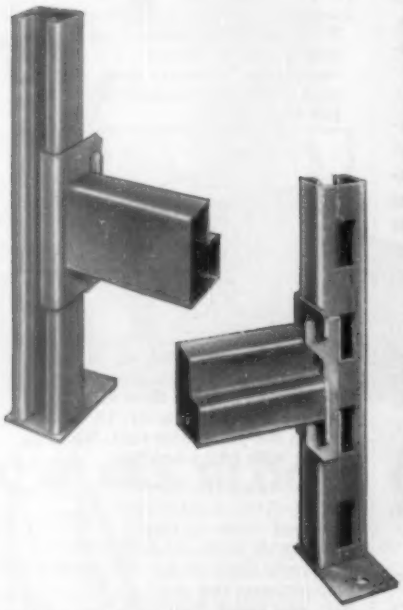
American

Slide-n-Lock adjustable

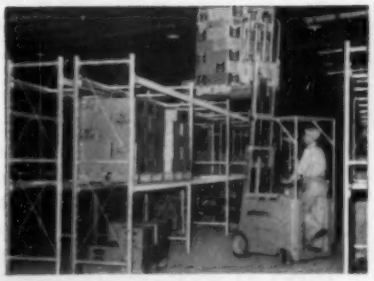
(Model SL-2)

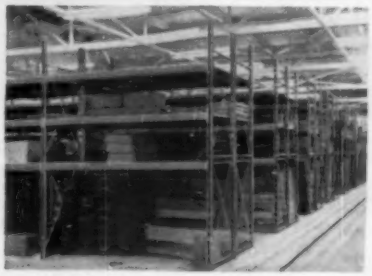
STORAGE RACKS

give you more features...more value!



View on left above shows the smooth line construction of the aisle side of post and stringer. There are no protruding edges to create hazards. View on right shows the rigid connection when the stringer is "locked" to the post. Both views show the "L"-shaped tubing (no open seams — it is a one-piece continuous welded tube). Stringers raise and lower like a window.





Stronger and heavier POSTS for greater resistance to shock and abuse . . . "L"-shaped — no open seam STRINGERS (see copy at left) . . . greater aisle safety (see copy at left). Double cross bracing — material always in tension and not compression, means greater rigidity. Racks can be adjusted to floor irregularities with turnbuckles. These are only a few of the many features of American Slide-n-Lock racks.

send for catalog!

over 800 different sizes and capacities from 5 basic parts

NO BOLTS NO WELDING IMMEDIATE DELIVERY

AMERICAN METAL PRODUCTS COMPANY
STORAGE RACK DIVISION
5959 Linsdale Ave. amp® Detroit 4, Michigan

WORLD'S NO.1 INDUSTRIAL MARKER!

King Size
Flo-master
Felt Tip Pen

Marks **BIG** and **BOLD** on *any* surface! Especially designed for heavy duty use at your Shipping Room Table – Factory Bench.

King Size Flo-master has a greater ink capacity, uses larger felt tips (up to 1" wide) than any other marking instrument. For use with:

- Transparent marking inks, *all colors*
- Paint-like, opaque pigments, *all colors*
- Most industrial solvents

Dual-purpose, snap-on cap may be screwed to table or work bench as a convenient, permanently-secured receptacle. Installed as shown, receptacle is airtight, keeps felt tip always moist, clean and free from factory dust and dirt, always ready for instant-marking on metal, glass, wood, plastics, rubber, fabrics.

By the makers of the *pocket-size* Flo-master Felt Tip Pen—"The Standard of all Industry."

At your marking equipment supplier – or write direct to

Dept. FM9

CUSHMAN & DENISON

Carlstadt, New Jersey

QUALITY PRODUCTS FOR 75 YEARS

FACTORY / MATERIALS NEWS

Begins on page 230

For more about these items, circle item numbers on Reader Service Card next to back cover.

265—Transparent Polyester Film is so "tough" you can make a building out of it, cook in it, or use it for a permanent paper laminate. It comes in two general varieties: heat-sealable on one or on both sides and in a metalized form. *Minnesota Mining & Mfg. Co.*

266—Acoustical Form Board of Fiberglas can serve as a permanent form for poured-in-place lightweight roof deck, as an interior ceiling, as acoustical ceiling, and as roof insulation. Board is incombustible, absorbs up to 75% of noise. *Owens-Corning Fiberglas Corp.*

267—All-Steel Sandpaper is flexible, and comparable to medium-grade conventional sandpaper. Outcuts it by five to one and outlasts it more than ten to one without clogging. Will rasp, sand, and smooth all woods, plaster, plastics, soft metals. *Red Devil Tools.*

268—New Partition System that can be permanent or movable is easily erected with metal frame that doesn't involve complicated layout, drilling of holes, welding, or riveting. Any type paneling may be used. Doors and shelving fit into framing. *Unistrut Products Co.*

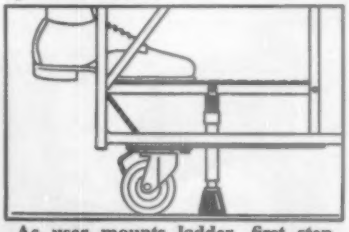
269—Chemical Cleaner, K-35, makes cleaning stone and masonry safe and simple. Cleaner works equally well on natural stone (granite and marble), and on materials such as brick, cement, and stucco. Can be brushed on, then rinsed off. *K & E Chemical Sales Co.*

270—Vanadium Metal, with 99.5% minimum vanadium content, is now available in quantity. Various sizes include single irregular buttons up to 25 lbs., irregular buttons from about ¼ to 3 lb., as-cast ingots in weights up to 3 lb., other sizes. *Vanadium Corp. of America.*

271—Concrete Adhesive and a coating are two new epoxy resin products for use on concrete, cinderblock, brick walls, swimming

NEW BALLYLOCK MAKES "Hi-boy" LADDERS EASIER TO USE!

With Ballylock open, hinged first step is slightly raised . . . rubber-tipped legs are above floor. Ladder rolls easily and quickly from one job to another.



As user mounts ladder, first step lowers to normal position, the legs descend to grip the floor firmly, and a latch engages securely. To release, touch Ballylock with foot. No fumbling with tricky catches.

Ballylock "Hi-boy" Safety-Step Ladders equipped with a new locking device — the Ballylock—help make maintenance and repair jobs faster than ever. The new Ballylock works with amazing ease and is absolutely foolproof.

"Hi-boy" Ladders are available in the new pyramid design from 8 to 12 steps for average work levels up to 15 ft.

Write for new Catalog describing the complete line of Ballymore equipment for above-floor working safety. The Ballymore Company, West Chester 23, Pa.

BALLYMORE
EQUIPMENT FOR ABOVE-FLOOR WORKING SAFETY

THE STANDARD BY WHICH ABOVE-FLOOR SAFETY IS JUDGED

DISTRIBUTORS IN PRINCIPAL CITIES

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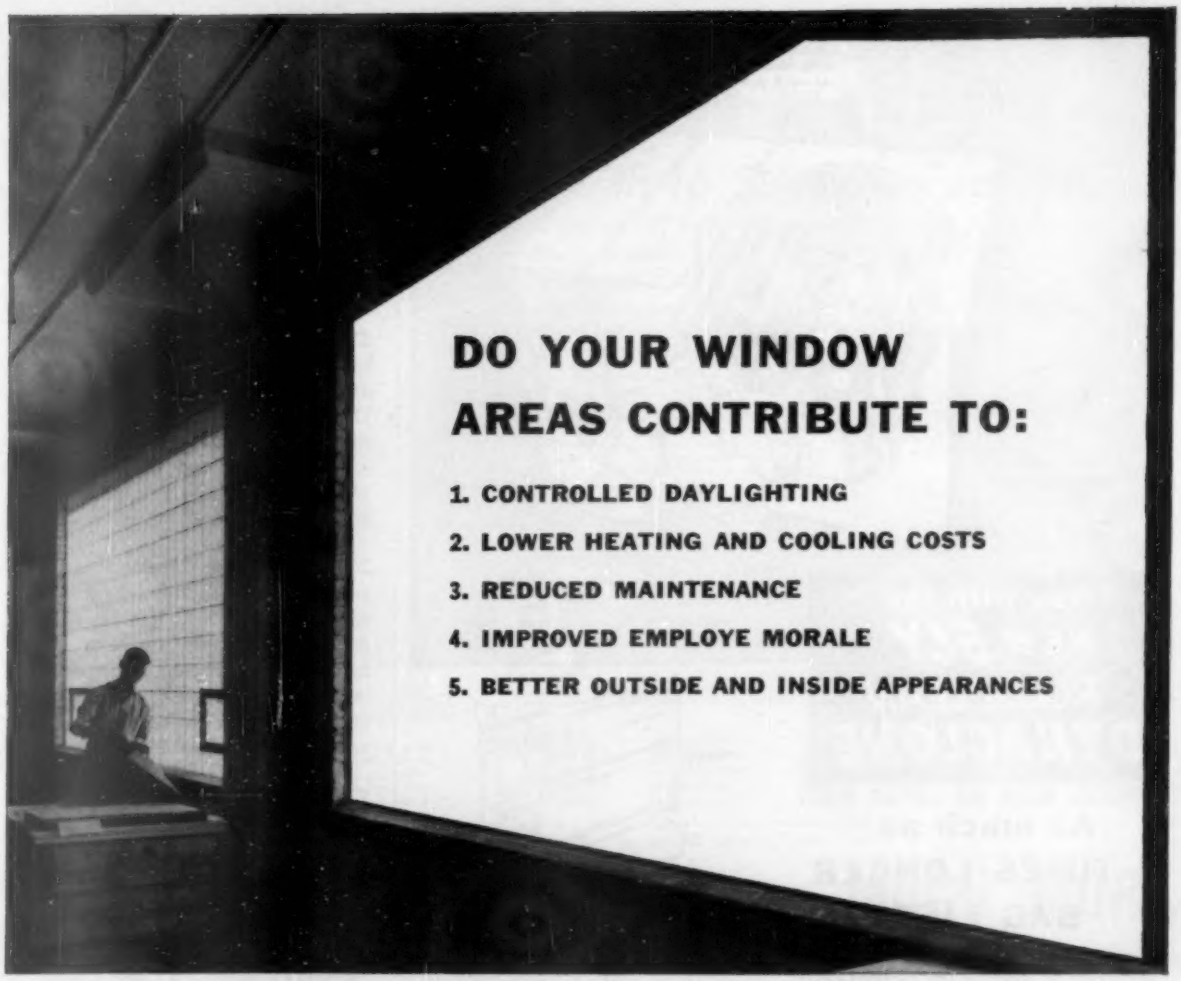

DO YOUR WINDOW
AREAS CONTRIBUTE TO:
1. CONTROLLED DAYLIGHTING
2. LOWER HEATING AND COOLING COSTS
3. REDUCED MAINTENANCE
4. IMPROVED EMPLOYE MORALE
5. BETTER OUTSIDE AND INSIDE APPEARANCES

PC GLASS BLOCKS CAN HELP YOU ON ALL 5 COUNTS

Whether plans call for new construction or plant modernization, you'll find it profitable—for a number of reasons—to investigate PC Glass Blocks.

First of all, they do a real job of controlling daylight. Functional patterns direct or diffuse natural light.

Result: Plant interiors are free from glare and shadows. Workers see better, perform more efficiently.

Insulation value is another Glass Block benefit. This product has the thermal efficiency equal to an 8-inch thick masonry wall.

Result: Heating and cooling costs are reduced. Surface condensation is practically eliminated.

Glass Blocks not only control daylight, they create a pleasant, cheerful environment in working areas.

Result: Employes are more comfortable, more relaxed, and adjust better.

Low maintenance is high on the list of Glass Block advantages. They are *mortared* into panels.

Result: There's nothing to rust, rot, or paint. Breakage is rare. And a once-or-twice a year washing is usually adequate.

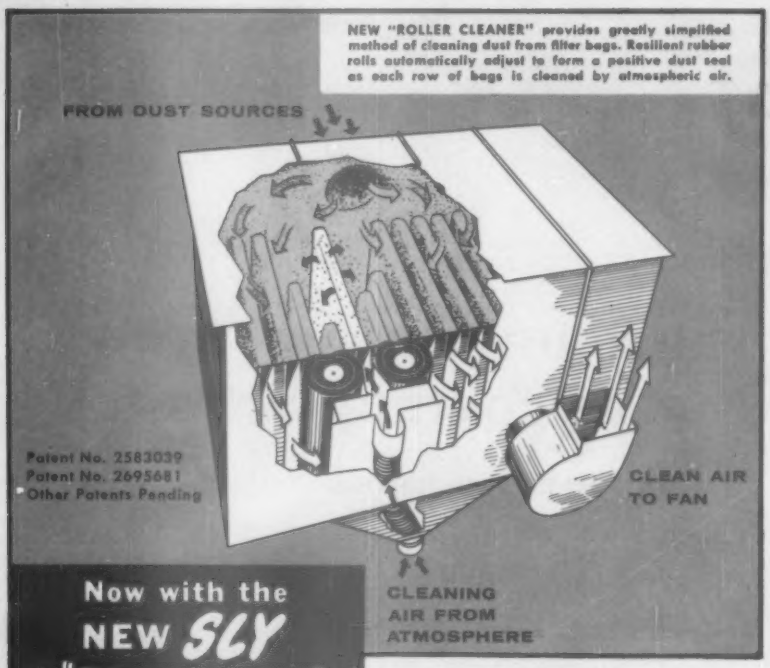
And architecturally speaking, Glass Blocks bring smart, modern lines to window area panels or curtain wall construction.

Result: Your building exteriors keep up-to-date and remain assets to the community.

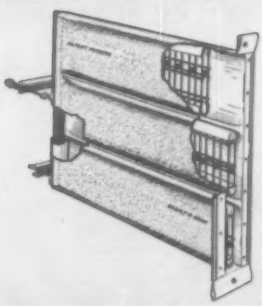
PC Glass Block benefits are making good investment-sense to thousands of industrial plants throughout the country. We'd like you to know more about how this product can pay off for you. Write: Dept. N-98, One Gateway Center, Pittsburgh 22, Pa. In Canada: 57 Bloor Street West, Toronto, Ontario.

PITTSBURGH CORNING CORPORATION

Also manufacturers of FOAMGLAS® insulation


NEW "ROLLER CLEANER" provides greatly simplified method of cleaning dust from filter bags. Resilient rubber rolls automatically adjust to form a positive dust seal as each row of bags is cleaned by atmospheric air.
FROM DUST SOURCES
Patent No. 2583039
Patent No. 2695681
Other Patents Pending
CLEAN AIR TO FAN
CLEANING AIR FROM ATMOSPHERE

Now with the NEW SLY "ROLL-CLEAN" DYNACLONE



As much as 3 TIMES LONGER BAG LIFE

NEW SLY "RESIST-O-WEAR" FILTER BAGS (patent pending) provide complete dust filtration with as much as three times longer life than conventional bags. This has been proved on the toughest field installations.

The new bag has three equal-size sections. Each pocket has two spacers, making a total of six per bag. Weight is distributed on three seams rather than one, minimizing strain. A special protective flap on the back end prevents abrasion from incoming dust.

Now standard in the new "Roll-Clean" Dynaclone, Sly "Resist-O-Wear" bags combine with all the other superior Dynaclone features to assure greatest dust collecting efficiency with unequalled maintenance-free service.

ALL THESE FEATURES IN ONE DUST FILTER

- New "Resist-O-Wear" bags last as much as three times longer.
- Constant suction at dust sources—complete dust collection.
- Automatically self-cleaning for continuous operation.
- Free-rolling cleaner. Complete dust seal—automatic seal adjustment.
- Greater filtering capacity; smaller space requirements.
- Simplified construction for ease of inspection and servicing.

SEND FOR New Bulletin 105 and New 36-page Dust Control Catalog 104.

SINCE 1879 SLY

THE W. W. SLY MANUFACTURING CO.

4755 TRAIN AVENUE • CLEVELAND 1, OHIO
OFFICES IN PRINCIPAL CITIES

FACTORY / MATERIALS NEWS

Begins on page 230

For more about these items, circle item numbers on Reader Service Card next to back cover.

pools, tanks, etc. The adhesive is for bonding concrete to concrete. Coating is for weather- and waterproofing. *American Metaseal Corp.*

272—Silicone Rubber Compounds have been designed for fabrication of O-rings, gaskets, and other seals. Designated SE-362, 372, 382, these three compounds offer better physical properties and improved tear strengths over earlier Class 300 compounds. *General Electric Co.*

273—Aluminum Coating is a liquid said to extend the life of roofs and sidings indefinitely. It reflects over 80% of sun's rays. Combines aluminum with reinforcing asbestos fibers in an asphalt base. Brushed or sprayed on such surfaces as wood, asphalt, metal. *Bird & Son, Inc.*

274—Control Tape that will not stretch out of shape during use is made of smooth 0.005-in. thick slate gray vulcanized fiber. It's designed for use on such equipment as electronic typing calculators and automated fabricating machinery. *National Vulcanized Fibre Co.*

275—Three Insulation Adhesives (two solvent-thinned, one water thinned for use with fire hazards) have been formulated for application of fibrous insulation to metal surfaces. Long open-tack time (from one to two hours), good brush-on characteristics. *Insul-Coustic Corp.*

276—Rigid Plastic Pipe, designated HTHT, can be used at temperatures as high as 180 F. and at pressures averaging 100 psi. Pipe is immune to rust, electrolytic corrosion, offers high resistance to wide range of corrosive chemicals. Many uses. *Carlon Products Corp.*

277—Pre-Mixed Urethane Foam components now come in two-part drum package and when combined produce a rigid non-friable foam. Density is controlled from batch to batch (thus eliminating mixing errors). Two types of foam come in this form. *Allied Chemical Corp.*

ERIEZ announces New "SERIES 16" line of PERMANENT PLATE MAGNETS

with 16 Superior Features

Some of the many design advantages of "Series 16" magnets

Increased magnetic strength; strongest available • Comparable or greater magnetic area than other separators • Insulated against loss of magnetic effectiveness • No sharp corners—safest, fastest and easiest to clean • Optional face plates for abrasive, corrosive or sanitary use • Units can be gasketed for liquid or dust-tight applications

New "Series 16" magnets proved *strongest, most efficient* units made . . . provide ultimate in operating advantages at price of ordinary magnets

New HI-POWR magnets give you a new "high" in protection against tramp iron damage or contamination by iron fines. Protects machinery, prevents product contamination, reduces downtime, increases production.

Exclusive Eriez design and construction provide peak magnetic efficiency and performance—actual tests show "Series 16" magnets *trap and hold* more metal from material flows than other units. Heavy duty non-removable extruded aluminum cover takes the roughest use . . . increases structural rigidity . . . prevents pilfering or tampering with magnetic circuit and loss of magnetic power.

ONLY ERIEZ OFFERS PLATE MAGNETS DESIGNED FOR YOUR EXACT APPLICATION . . .

When you choose an Eriez "Series 16" Separator, you are assured of obtaining a unit designed to provide the finest type of separating efficiency for *your* operating conditions. Years of leadership in engineering and application know-how have gone into building these models to meet industries' diversified needs. "Series 16" Plates are available in three magnetic strengths . . . standard, part stainless or all stainless steel construction . . . in single, double or triple row assemblies as one integral unit . . . *with smooth face plates, liquid tight face plates, tapered step plates and open air gaps.* Various strengths alone won't do the job . . . take advantage of the most versatile line available . . . get the separator best suited for your *exact* needs!

Proved best by test! Pull tests, Gauss readings, dynamic tests and other methods prove Eriez "Series 16" plate magnets stronger than other comparable separators. Centered concentration of magnetic forces is the most effective circuit for tramp iron removal from material flows. Equal barriers of magnetic force pull downward, stop tramp iron and pull it through burden depths of material where it is held at the powerful concentrated middle air gap. *No other design offers so much effectiveness!*

FREE! BIG 6-page fact-filled folder tells the complete "Series 16" story. Full descriptive data, charts, graphs, actual installation photos, "how to order" information, etc. Be sure to get your copy. Write today to Eriez Mfg. Co., 70J Magnet Drive, Erie Pa.

ERIEZ HI-POWR MAGNETIC SEPARATORS

Magnetic SEPARATION AUTOMATION VIBRATION Equipment

ERIEZ

For more facts circle 616 on Reader Service Card

ANOTHER *PANNIER* MASTER MARKER!

New Roto-Pin type lock is integral part of *all* Pannier Supreme Holders . . . eliminates loose, bent, dropped, or lost pins . . . flip it open to change type . . . flip it back to securely lock type in clear-marking position.

PANNIER'S SUPREME HOLDER WITH ROTO-PIN LOCK

Safe, fast type changing. Holder in variety of styles. Machined from High-Grade Bar Tool Steel. Hardened anvil maintains type alignment. Striking Head of Tool Steel . . . Replaceable to add long service life to Holder.

Write for complete data.

DISTINGUISHED MATERIALS

MARKING PANNIER DEVICES

THE PANNIER CORPORATION

201 Pannier Building • FAirfax 1-5185 • Pittsburgh 12, Pa.

Offices: Los Angeles • Chicago • Cleveland • Philadelphia • Birmingham

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Now... MUCH MORE

Quality engineered features include:

- Patented leak-proof hydraulics
- 4-1/3" lift in three strokes
- Side thrust free ram
- No-drop handle
- Self-leveling steering wheels
- Pallet entry rollers
- Sectional steel forks
- Taper roller bearings

for only $358

Capacities: 2200, 3500, and 4400 lbs.
Choice of steel, aluminum, rubber, nylon, or plastic wheels.

New MULTITON STEIN BOCK FULLY HYDRAULIC

PALLET TRUCK

Write for complete information

STOKVIS ⚬ EDERA & CO., inc.

Dept. FM9, 18 Secatoag Ave., Port Washington, N. Y.

circle 618 on Reader Service Card

Vending machines will provide full meals . . .

. . . or supplement your cafeteria line.

You can dress them up ◆ and get outside service ▼

How to Get

LOOK at the photos and the chart on these two pages. The photos show some of the things you can get for automatic in-plant feeding. The chart tells you the pro's and con's of the three main systems for feeding plant employees. And the six rules in the text tell you how to get the most out of your automatic system.

Automatic "machine" lunches may lack the personal touch and leave something to be desired in potential food variety. But if you have no in-plant feeding facilities now, or if the cost of your present feeding system is giving you the cafeteria jitters, machine vending may be your answer. With an automatic system you can get completely out of the food business except for janitorial service and utilities. And plants that have automatic vending installations report the problems and expense of clean-up, water, and electrical supply are minor.

Today's vending machines can supply a hot, full-course meal fast —400 to 500 employees in 30 minutes. And at low cost. Trusted brand names on the food containers give employees and managers confidence in the quality and purity of all products. And the convenience of having the lunch facility close to the work area is popular with employees, especially if they are limited to 30 minutes for lunch.

Now read the six rules for installing and maintaining automatic feeding in your plant. If you follow these, you'll get the most out of your automatic system.

By THOMAS A. BUCKLEY
Vice President, The Vendo Company
Kansas City, Mo.

the Best in Automatic Feeding

1. TAILOR YOUR SERVICE

First question is whether you'll use automatic feeding as your only in-plant feeding method, or as a supplement to your present cafeteria or lunch-cart service. If you have a comfortable cafeteria that workers enjoy (and don't assume that worker gripes mean they don't like it), you'll have trouble closing it down. In that case, you can at least cut costs and reduce lunchroom tie-ups by installing fresh-brew coffee, milk, soft drink, candy, and cigarette machines in the cafeteria. But install them outside the cafeteria line. That way, workers who bring their lunches from home can get their vended items without waiting.

If you have an established food service that workers like, machines may answer only your coffee-break problems. They're available at all times and shifts, eliminate need to open cafeteria between meals. Your break time should be less if machines are close to work centers. According to the Ohio Manufacturers' Association, 90% of all Ohio companies give rest periods—and 14% of these last longer than they should. And 60% of the companies in this 1956 study felt that vending machines are a good answer to the stretched-out coffee break.

It may be that your workers would be delighted if they could avoid the cafeteria. Food quality, prices, atmosphere, travel time—all are common complaints. United Airlines has a fine cafeteria at its 129-acre maintenance base in San Francisco. Travel time was such a problem that full-line vending installations have been successfully added in concentrated work areas on the base.

2. GET A GOOD OPERATOR

Best plan is to leave the operation of vending machines in the hands of a reliable operator. Companies that try to operate the machines themselves usually have problems. Automatic feeding is a specialty—demands special skills and experience. And you *do* want to get out of the food business. Right?

Here are three ways to find a good vending operator:

. . . *Write to* the National Automatic Merchandising Association, 7 South Dearborn St., Chicago. The association maintains lists of vending operators, their specialties, and the areas they serve.

. . . *Look through* the classified pages of your phone book. But check with other customers of any operator you locate this way. Find out if his service has been reliable, intelligent, satisfactory.

. . . *Write to* the manufacturer of any machines you are interested in. He'll recommend an operator to install and service them.

Estimates vary on the number of employees required to turn a reasonable profit from a machine battery. Some operators consider 200 a reasonable minimum. Others go as high as 400 minimum. Local conditions and the habits of plant people have a heavy influence. Some towns and plants have the "bring-your-lunch" habit—others have the "get-lunch-at-the-plant" habit.

In any event, your operator's estimate of business potential will determine his bid for your plant's business. If the potential is high, he will offer lower prices or a commission for your plant's business. (Most managements do not accept commissions, prefer to see any advantage passed along in reduced prices.) If his estimate of business potential is low, the cost of his services will be higher.

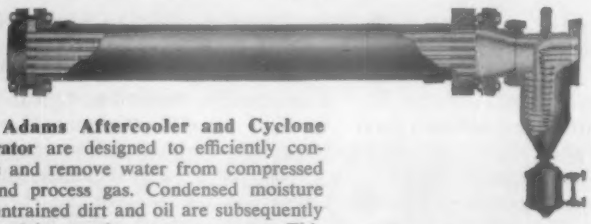
Turn the page

HOW THREE KINDS OF FOOD SERVICE COMPARE

	1. IN-PLANT CAFETERIA	2. LUNCH CARTS	3. VENDING MACHINES
FOOD:			
Quality	Variable	Variable	Uniform
Variety	Unlimited	Medium range	Limited
Sanitation	Difficult	Difficult	Easy
Price	Varies with subsidy	Varies with subsidy	Low
COST TO COMPANY:			
Installation	High	Moderate	None
Space	Big	None	Little
Subsidy	Often high	Often high	Often none
Clean-up	High	Fairly high	Low
Administration	Many employees	Some employees	Janitor only
SERVICE:			
Speed	Often slow	Varies	Usually fast
Availability	Limited	Scheduled	All times
Distance from work area	Remote	At scene	Close by
Personal touch	Yes	Yes	No
Reliability	Good	Good	Occasional malfunction

Aftercooler and Cyclone Separator designed for cleaner, dryer compressed air

R. P. ADAMS CO., INC.
215 East Park Drive, Buffalo 17, New York



The Adams Aftercooler and Cyclone Separator are designed to efficiently condense and remove water from compressed air and process gas. Condensed moisture and entrained dirt and oil are subsequently removed in a cyclone type separator. This unit is scientifically designed for maximum removal efficiency over a wide range of flow rates.

For normal use, units are available to cool gases to within 10° F of the temperature of the cooling water. Specially designed units are available to permit a 2° F approach to cooling water temperature, for application where low moisture content is critical.

Adams Aftercoolers and Separators are available from stock to handle 20 - 40,000 cfm with 10° cooling and 25 - 19,200 cfm where it is necessary to cool within 2°F of the cooling water. Special units can be supplied to suit an unlimited range of requirements. In all cases the maximum pressure loss at rated capacities is ½ psi.

This wide range of sizes enables the economical utilization of Adams Aftercoolers and Separators in virtually all industrial application. For further information on how R. P. Adams' units will solve your compressed air problems and save you money, write today for **Bulletin 711.**

For more facts circle 619 on Reader Service Card

only
RAYNOR
builds
OVERHEAD DOORS
like these...

Insuring Lasting SATISFACTION and SERVICE

Look to Raynor for those *exclusive* engineering features that provide lasting satisfaction and trouble-free operation in overhead garage door installations. Raynor's "graduated seal" for example, assures easy rolling and finger tip control – yet the door is held tightly against the jamb for secure weather-tite closure . . . a famous Raynor feature.

KNOW THIS MARK OF QUALITY
RAYNOR MANUFACTURING COMPANY
DIXON, ILLINOIS
Builders of a complete line of Wood Sectional Overhead Doors

AUTOMATIC FEEDING
Begins on page 242

If you want more machines than the operator feels the traffic will support, you'll have to subsidize the operation — perhaps with a weekly guarantee. And, of course, price isn't the only consideration. You'll have to weigh bid prices against reputation and services.

Once you've made an agreement with an operator, he'll take care of the rest of the installation problems and expenses. He'll have the required plumbing and electrical connections made. He'll supply the machines and have them installed.

Your operator wants to give your employees good service. And he wants to make a profit. Like any businessman, he will try to get maximum traffic for each piece of equipment he installs, and he'll get the best profit the traffic will bear. Your job: Make sure your employees get their fair return from the machines, too—in terms of good service at attractive prices.

3. MAKE IT LOOK GOOD

Your operator will survey your plant. He'll study employee population, plant layout, number of shifts, traffic, availability of utilities, etc. After that he'll recommend machine placements, number, type, etc.

You'll contribute space for the machines. (They take about 40 linear inches each.) And you'll have to provide additional space for a can opener, cup dispenser, coin changer, waste receptacles, etc. These are the essentials for a machine battery. But any restaurateur will testify that food is far from the whole story in customer satisfaction. Atmosphere, comfort, service are also key determiners of satisfaction.

You can't do much about individual service in a machine installation. But you can influence atmosphere. The French motif used at National Brewing Company, Baltimore (third photo down, p. 242), is an example. Our organization (Vendo) fixed up a machine battery as a western town in our plant. Western interest is strong here, and employees seem to identify their recreational interests with the machine battery, their lunches, rest periods.

You can influence the comfort

For more facts circle 620 on Reader Service Card

Hook or trolley mounting
Automatic Disc Brake . . . four times more braking area!
Weight 30 LBS.
Roller Chain (as illustrated) or Link Chain
Pendent Control (as illustrated) or Pull-Cord Control
1000 LBS
30 LB. THOR AIR HOIST LIFTS OVER 30 TIMES ITS OWN WEIGHT

NEW!

Fastest lifting, fastest lowering rate of all small air hoists!

Thor PORTABLE POWER TOOLS

Best control for pin-point load spotting!

Here's real husky lifting power—Thor's new compact, portable air hoist which can be handled easily by one man. Lifts up to 1000 lbs. Infinitely variable speed control from dead slow to 50 ft. per minute lift, 96 ft. per minute descent under full load—all in one hoist! Ask for Bulletin No. JE-2367 for complete details. Better yet, see a demonstration in your own plant!

Thor Power Tool Company
Aurora, Illinois
Branches in all principal cities

For more facts circle 621 on Reader Service Card

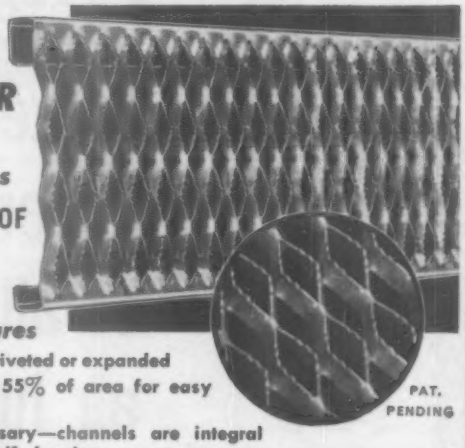
two superior open steel
FLOOR GRATINGS
BY GLOBE

1 Safety GRIP-STRUT®

FOR MAXIMUM SAFETY ALL OVER YOUR PLANT

Important Safety Features

★ FIRE PROOF ★ SLIP PROOF
★ MAXIMUM STRENGTH
★ MINIMUM WEIGHT



Important Economy Features

★ All one piece, not welded, riveted or expanded
★ Open space in excess of 55% of area for easy access of light and air
★ No extra supports necessary—channels are integral part of the material. ★ Self cleaning
★ Cut and installed like lumber by your own maintenance force. ★ Low in original cost. ★ For balconies, no secondary sprinkler heads needed

PAT. PENDING

Ideal for work platforms, stair and ladder steps, flooring, balconies, catwalks, machinery guards, fire escapes and for original equipment safety treads.

2 GOLD NUGGET® WELDED grating
PAT. PENDING

The QUALITY GRATING for Heavy Duty Applications

★ 3/16" projection weld nugget for greater rigidity and strength
★ Vertical alignment of the main load bar assured
★ All bars are load carrying bars including secondary bars
★ Anti-skid pattern

PROJECTION WELD

Each secondary load bar (A), as projected welded to the primary load bar (B) has a shear strength of 5,000 pounds per weld. There are 28 such projection welds to a square foot of grating. This means that GOLD NUGGET Welded Grating can sustain greater shock loads than other gratings.

For the complete details of these revolutionary new gratings, write for new catalogs today. Distributors in all principal cities. Consult the yellow pages in your phone book under "GRATING".

108

PRODUCTS DIVISION
The GLOBE Company
MANUFACTURERS SINCE 1914
4014 SOUTH PRINCETON AVENUE • CHICAGO 9, ILLINOIS

Begins on page 242

your employees enjoy. Setting aside an eating area—clean tables and chairs, perhaps an atmosphere of its own—helps employees relax during lunch and break periods. Result should be less fatigue, better morale, improved job performance.

4. SELL YOUR EMPLOYEES

You can expect an easy sales job if the installation is attractive, if you're using name-brand foods, and if your prices are in line. But for insurance, a little communication never went amiss.

One plant manager wanted his employees to use a machine rather than make a long outside trip to a coffee shop. So he wrote a cheerful note, enclosed a dime for the first day's coffee. Result: Employees discovered that vended coffee is good. The change in office break habits was made. And the manager saved his thinning locks.

Your plant paper or a special mimeographed sheet explaining the vending system will help head off the rumors. Few operators pay management a commission based on sales, but your employees might get that idea if you don't give them the facts. Your story line is simple: The machines are an employee service.

5. KEEP STANDARDS HIGH

No need to worry that the vending equipment in your plant will fail to meet local health standards. All machines built by reputable manufacturers are uniformly acceptable to health codes. But it's a good idea to check whether your community has adopted the most advanced U. S. Public Health Service recommendations—and to suggest change if it is lagging behind.

For example, the Public Health Service, with the help of the vending industry, recently developed a new dairy products code. The code requires that milk be delivered at 50° F. or under and that all unrefrigerated parts coming into direct contact with milk be removed and sanitized daily. The code also requires that cleaning and sanitizing records be kept for each machine, that waste disposal containers be

LOOKING for the RIGHT CUTTER for those *IMPOSSIBLE* METAL CUTTING *Jobs!*

Here's the Curtain-Raiser to a Quick Solution!

HKP PORTER CUTTERS

There's a HAND or HYDRAULIC powered PORTER CUTTER to answer your toughest metal-cutting problems — over 100 different cutters, all designed to save you time, labor, and money! Make short work of cutting:

• Bolts • Rods • Screws • Rivets • Wire • Chain • Steel Strapping • Soft, Medium & Hard Metals & Many Others

CUT LABOR COSTS UP TO 97%

The famous PORTER CENTER-CUT CUTTER . . . our most popular tool . . . is the leading all-around cutter for industrial use! For Free Cutting of Soft and Medium Hard Metals up to ¾". Available in 6 sizes.

. . . and for "PRODUCTION" CUTTING

The PORTER WORK-STATION CUTTER can increase one man's output up to 300% in continuous volume cutting! In 3 sizes — up to ½" capacity!

ALSO . . . for those RUGGED JOBS!

The PORTER HEAVY DUTY CUTTER cuts almost anything in metal up to ¾" diameter — thanks to its heat-treated, hard-tempered center-cut jaws! Comes in 3 sizes.

Contact your Industrial Distributor . . . or write for your free catalog with illustrated, detailed descriptions of the versatile PORTER line!

CUT up to ¾" rods with HAND OPERATED TOOLS — up to 1¾" rods and 2½" power cable with POWER OPERATED TOOLS.

H. K. PORTER, inc.
Somerville 43, Mass.

WHY PAY MACHINISTS TOP WAGES TO WAIT AT A TOOL CRIB?

Stop costly waiting . . . use new McCaskey Tool Control System!

NOW! Completely eliminate time lost by highly-paid machine operators drawing and returning tools. New procedures in McCaskey's famous Tool Crib System allow crib attendants to prepare kits of tools for jobs in advance. Machine operators simply pick them up, or they may be delivered.

No Time Wasted At Tool Crib, More Working Time At Machines

Hundreds of plants report that the McCaskey System also reduces tool purchases by cutting crib inventories; reduces loss and theft; cuts costs so many ways it pays for itself in 90 days. *Send for complete details today!*

VICTOR

McCASKEY INDUSTRIAL CONTROLS

Tools • Gages • Scheduling • Job Assignment

Division of

VICTOR ADDING MACHINE CO.

3900 N. ROCKWELL STREET • CHICAGO 18, ILL.

VICTOR ADDING MACHINE CO. (Canada) LTD.

GALT, ONTARIO

Manufacturers of Business Machines, Cash Registers, Business and Industrial Systems, Electronic Equipment, Electri-Cars

Look for the Victor direct factory branch in the Yellow Pages under adding machines, or mail the coupon.

Find Your Nearest Dealer in The Yellow Pages

Victor Adding Machine Co.
McCASKEY INDUSTRIAL DIV., Dept. FM-958
3900 North Rockwell St., Chicago 18, Illinois

☐ Rush complete details about the new features of the McCaskey System.

☐ Send me your free booklet, "How Tool Costs Were Cut 12 Ways in 20 Plants."

Name .....

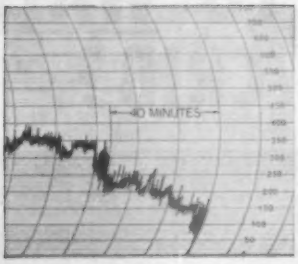
Position .....

Company .....

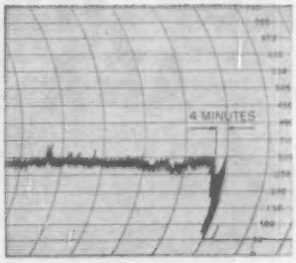
Address .....

City ..... Zone ..... State .....

Pay Starts When the Whistle Blows
How About Production?



Ask for Bulletins Nos. 236A and 856



One department in a large plant took 40 minutes to reach production in the morning (left). Another took only 4 minutes. *No one knew about the loss until it was measured.* A complete survey took 3 years and saved $235,000 a year.

Not all of this time was the fault of the employees. Systematizing delivery of tools and stock, adjustments in production routine all helped. *After Graphic Instruments pointed the way.* Let us show you how to operate more efficiently too.

"The Meter With a Record" For Over 50 Years

The ESTERLINE-ANGUS Company, Inc.
Pioneers in the Manufacture of Graphic Instruments
Dept. J, P. O. Box 596, INDIANAPOLIS 6, INDIANA

For more facts circle 625 on Reader Service Card

New Push-Button Dispenser for Mac's Waterless Hand Cleaner

Now, cut hand cleaner bills 60%! Beautiful copper-finish aluminum dispenser measures exact amount of hand cleaner needed. Mac's Waterless Hand Cleaner acts fast to remove deep, imbedded grease, ink, paint and grime. Contains lanolin to prevent dryness and chapping. Dispenser regularly sells for $9.00. Now, for a limited time only, you can get the dispenser *plus three 5 lb. cans of Mac's Waterless Hand Cleaner* for just $9.84. Over 100 jobbers carry warehouse stocks. If yours cannot supply you, order direct for prompt prepaid shipment.

MAC'S SUPER GLOSS CO., INC.
640 North Figueroa Street • Los Angeles 42, Calif.

Begins on page 242

available near the equipment, that the area around the machine be kept clean, and that periodic inspection of the operator's equipment be made by milk control agencies.

Weekend and holiday lapses normally will not spoil food left in machines. Hot foods have a machine life of from three to 17 days. Milk has been kept fresh as long as two weeks. Sandwiches, pastry, and salads should be good for five days.

Large installations may merit a clean-up, stock-up, machine-maintenance man in the plant at the vendor's expense. But most often the plant supplies its own janitorial service. It's not a big problem. G. C. Berteau, director of personnel for American Motors, says, "We were surprised to learn that housekeeping is not as great a problem with machines as it was when we had catering carts in here." The machines limit débris to specific areas. The janitorial job is just a matter of picking up cups, plates, etc., and cleaning the floors. There's no silverware problem because plastic utensils are used. Operators clean their own machines.

6. KEEP INTEREST UP

Though you're relieved of the burden of running a food service when you enter an agreement with a vendor, it's best to keep abreast of the service and of your worker reaction. You can reserve the right to review all prices and menus offered. And you can keep a general eye on the operation. If your system includes sandwiches and salads packaged by the operator, you can and should make regular inspections. You can insist that all canned and packaged foods be name brands.

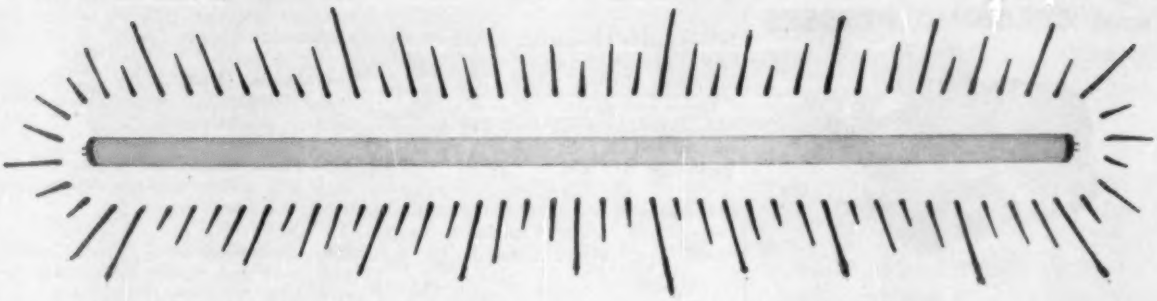
You can help your operator do a better job in three easy ways:

. . . *Let him use* a small closet-type enclosure for storing his non-perishable items.

. . . *See to it* that he has a separate, locked fuse box and adequate 24-hour power for the machines.

. . . *Report breakdowns* quickly, so the machine can be repaired promptly—before too many employees have been inconvenienced. **END**

Goodbye, "Dead-Ends"!



Westinghouse lamps stay bright from end to end...

l-o-n-g-e-r !

New Westinghouse chrome vanadium alloy leads reduce end blackening— keep lamps bright end to end longer.
WESTINGHOUSE
40W COOL WHITE
U S A

"ULTRALUME" phosphors coat the inside of all Westinghouse fluorescent lamps. Only Westinghouse has "Ultralume"...the phosphors that assure maximum brightness for the life of the lamp.

Banish light-robbing, unsightly "dead-ends" on your fluorescent lamps. Next time, use Westinghouse lamps with exclusive "Ultralume"™ phosphors and new chrome vanadium alloy leads. The combination of revolutionary new leads and Ultralume phosphors make Westinghouse lamps give maximum light longer and keep them bright end to end!

Save money, too! Lamp for lamp, Westinghouse fluorescents give more light for the same wattage. You get more light per foot . . . more light per dollar!

Specify Westinghouse on every lamp order. Call your local authorized Westinghouse agent or write—Westinghouse Lamp Division, Bloomfield, N. J.

YOU CAN BE SURE...IF IT'S

Westinghouse FLUORESCENT LAMPS

Intricate Shapes

BY THE THOUSANDS

There's no limit to the number of intricate shapes quickly and easily turned-out on

THOMSON DIE CUTTING and CREASING PRESSES

for Cloth, Plastic, Leather, Rubber, Composition, Cork, Linoleum, Wood, Thin Metals, Fibre, Cardboard, Hardboard, Masonite and many other sheet stocks.

Cutting and Creasing Presses can — in one operation — cut holes, slots, serrations, irregular shapes, perforations, knock-outs and segments. Steel rule cutting knives can be formed to any shape thereby eliminating expensive dies. And embossed printed circuitry, book covers, etc.

Up to 2000 impressions per hour can be turned-out with a Thomson Cutting and Creasing Press. Change multiple operations into a complete, one-step method of fast, accurate production.

Cutting and Creasing Presses are already used in the manufacture of toys, games and puzzles, floor tiles, gaskets, panels, chassis parts, sub-assemblies advertising displays, insulations, gussets and stiffeners, etc.

INVESTIGATE THE APPLICATION OF A THOMSON CUTTING and CREASING PRESS TO YOUR PRODUCTION LINE

THOMSON-NATIONAL PRESS COMPANY, INC.

Franklin, Mass., Tel. Franklin 200

250 circle 628 on Reader Service Card

ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

ELECTRICAL

346—Rectifiers. Free "Guide" to industrial rectifier equipment is available on request. Sel-Rex Corp.

347—Control Equipment. Bulletin GEA-6606 describes supervisory control equipment. General Electric Co.

348—Fuses. Two bulletins: FIS on dual-element and HCS on high capacity fuses. Bussmann Mfg. Co.

349—Silicones. New booklet details advantages of silicone insulated equipment. Dow Corning Corp.

BUILDINGS

350—Fence. Free booklet, "Your Fence," gives complete data on several styles available. Cyclone Fence.

351—Plant Sites. Free booklet states facilities available for new plant locations. Reynolds Development.

352—Floor Plate. Application, design and fabricating data on abrasive tread plate. Aluminum Co. of America.

353—Roof Deck. Catalog 241 lists mechanical features of dual-purpose Acoustideck. Inland Steel Products.

354—Gratings. New catalogs now available describe two types of open steel floor gratings. The Globe Co.

355—Roofing. "Things You Should Know About Your Roof," gives data on survey plan. Johns-Manville Corp.

356—Steel Grating. Bulletin 2486 lists mechanical features of electro-forged steel grating. Blaw-Knox Co.

PLANT SERVICES

357—Towel Dispenser. Free bulletins available on controlled rolled paper towel dispensers. Steiner Co.

358—Dust Control. Bulletin 105, "Filter Bags," and No. 104 "Dust Control" (36 pages). The W. W. Sly Mfg. Co.

359—Dust Collectors. Bulletin 917, "Out of the Realm of Dust," shows applications. Pangborn Corp.

360—Motor Pumps. Latest bulletins give full information on cost-saving features. Ingersoll-Rand Co.

361—Heat Exchangers. Bulletin No. 132 gives complete data and mechanical features. Niagara Blower Co.

362—Radio-Pager. Free folder on new Handie-Talkie radio-pager. Motorola Communications & Electronics.

363—Centrifugal Fans. Catalog provides complete selection data for almost all applications. Carrier Corp.

364—Shower Units. Catalog 5601 includes illustrations, dimension data, specs. Bradley Washfountain Co.

365—Towel Dispenser. Case histories show 20% savings with new delayed-feed towel dispenser. Brown Co.

366—Communications. Case studies with facts and figures on business installations. Automatic Electric Co.

367—Compressors. Bulletin 87-1 gives complete details on full line and applications. Gardner-Denver Co.

MATERIALS HANDLING

368—Conveyors. Bulletin G.P. 53 and Catalog 586 cover live roller conveyors. Mathews Conveyor Co.

369—Truckster. Booklet describes lightweight powered truck for hauling and personnel. Cushman Motor Works.

370—Steel Shelving. Catalog gives complete facts on how to cut shelving costs. Borroughs Mfg. Co.

371—Mobile Electrification. Catalog describes mobile-electrification system for cranes. Insul-8-Corp.

372—Storage Racks. Complete catalog on full line for any industrial use. Equipment Manufacturing, Inc.

373—Crane Control. Bulletin 6431 gives details of full magnetic crane controls. EC&M Div., Square D Co.

374—Electric Trucks. New literature: "Gas vs. Electric Truck," "New Attachments." Elwell-Parker Electric Co.

375—Slings. Free handbook gives data plus complete rigger's manual. Union Wire Rope Corp.

376—Air Hoists. Bulletin JE-2367 gives complete details on new small air hoists. Thor Power Tool Co.

377—Tractors and Equipment. Folder contains detailed specifications on complete line. Ford Motor Co.

378—Fork Lift Trucks. Free booklet SP-23 describes features of new "Pace-Maker" series. Towmotor Corp.

Turn the page

At this Canonsburg, Pa., plant of Pennsylvania Transformer Division of McGraw-Edison Company, widely spaced Sylvania Fixtures using VHO lamps provide higher lighting levels in all work areas—at lower installation and operating costs.

Sylvania VHO Fixtures

for higher lighting levels with half as many fixtures

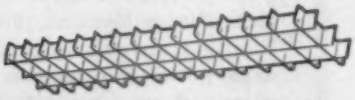
Spaced-out lighting fixtures can now deliver high footcandle levels over wide industrial areas!

Thanks to the development of the Sylvania VHO Fixtures, the 2½-times-greater light output of the new Sylvania VHO Fluorescent and the other higher-wattage lamps has been properly controlled for good quality of illumination. Its porcelain-surface reflector is slotted for 10% upward light component which reduces harsh overhead contrasts. It operates these new high-output lamps with a minimum of glare and a maximum of eye comfort.

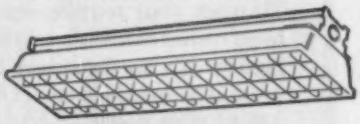
Sylvania VHO lighting is ideal for precision machine-work locations . . . critical inspection areas . . . other spots where high-level lighting is a *must*. It makes *high-bay* fluorescent lighting practical. For full information on the lighting performance of these fixtures, as well as the new low installation and operating costs, contact your local Sylvania Fixture Specialist, or write direct to Lighting Headquarters.

Channel (in eye-rest green) contains ballast and lampholders.

Porcelain reflector (white) is slotted for 10% upward light.



20-gauge steel louvers (green-tinted) provide necessary eye-shielding from the new higher-intensity lamps.



Sylvania VHO-2V14. One of several Sylvania models utilizing VHO lamps. This semi-direct fixture holds 2 standard-size 4-foot Sylvania Very High Output fluorescent lamps (VHO 25). Also in 8-foot length for 2 new 200-watt lamps.

SYLVANIA

Fluorescent Lighting Fixtures and Systems

Best fixture value in every price range

SYLVANIA ELECTRIC PRODUCTS INC.
Dept. J-1, Lighting Division — Fixtures
One 48th Street, Wheeling, W. Va.

LIGHTING • TELEVISION • RADIO • ELECTRONICS • PHOTOGRAPHY • ATOMIC ENERGY • CHEMISTRY-METALLURGY

For more facts circle 629 on Reader Service Card

Don't overlook the power of the worm!

H&S

WORM-GEAR SETS insure smooth driving action between perfectly mated members

Check these important advantages for your power transmission needs:

Smoothness of Operation • Ability to Carry Heavy Shock Loads
Compactness • Large Ratios • Reliability
Long Service Life • Self-Locking

Horsburgh and Scott worm-gear generating methods guarantee perfect mates in each set, with worm threads and gear teeth having identical pressure angles and tooth contours. Resultant smooth conjugate action delivers maximum right angle power transmission with minimum power loss. H&S gives each set a controlled inspection on the correct center distance for tooth contact, backlash and smoothness.

To meet your requirements H&S makes Worm Gears up to 60 inches diameter—circular pitch range from ¼" to 3½". Ratios can be furnished from 3-5/9:1 to 100:1 . . . For prompt response from H&S engineers, just send an outline of your needs.

THE HORSBURGH & SCOTT CO.
GEARS AND SPEED REDUCERS
5112 Hamilton Avenue
Cleveland 14, Ohio

ADVERTISERS' LITERATURE

Begins on page 250

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

379—Tramrails. "Automatic Handling" booklet lists wide variety of systems. Cleveland Crane & Engineering Co.

380—Adjustable Storage Racks. Catalog lists over 800 sizes and capacities. American Metal Products Co.

381—Lift Trucks. Bulletins on handling paper (27601), coils (349-1), housewares (507-1). Lewis-Shepard Products.

382—Trolley Conveyors. Book 2330 describes mechanical details and product applications. Link-Belt Co.

MAINTENANCE

383—Floor Machines. Literature describes line of floor machines and vacuums. Advance Floor Machine Co.

384—Ladders. Catalog covers complete line for above-floor working safety. The Ballymore Co.

385—Rustproofing. Free on request: illustrated booklet with color charts included. Rust-Oleum Corp.

386—Floor Absorbent. Bulletin, "101 Uses," describes properties of oil and grease absorbent. Speedi-Dri Div.

387—Lubricating Equipment. Complete catalog of industrial lubricating equipment. Alemite Div., S-W.

388—Maintenance Management. Booklet X1812 tells how to get more for maintenance dollar. Remington Rand.

389—Grouting. Guide shows 11 common machine settings, methods of grouting, forming. Master Builders Co.

390—Floor Cleaning Machine. Literature describes floor dry-scrubber machine. Finnell System, Inc.

391—Floor Absorbent. Descriptive pamphlet gives information and suggests applications. Floridin Co.

392—Floor Machine. Illustrated bulletin has performance data and traction-test results. G. H. Tennant Co.

PRODUCTION

393—Paint Spraying Pump. Bulletin 707 gives complete facts on this new bung-type pump. Binks Mfg. Co.

394—Schedule Board. Bulletin X-300 shows varied application of visual control board. Graphic Systems.

Turn the page

Any concrete worker or maintenance man

CAN LAY PERMANENT ANCOR STEEL FLOORS!

Even though it's a permanent non-skid steel surface, Ancor Flooring can be quickly laid by concrete or maintenance workers. Just remove loose material... pour a 1½" to 2" concrete base... tap plates level... and it's done.

Ancor Floors are *permanent* because 53 steel anchors grip concrete . . . *safe* because of 33 non-skid concrete safety islands per square foot . . . *quiet* because it has a smooth surface. Write for details and prices. Ackermann Manufacturing Company, subsidiary of Wheeling Steel Corporation, Wheeling, West Virginia.

IT'S WHEELING STEEL
circle 631 on Reader Service Card

POWERFUL NEW PLUNGER CLEARS

CLOGGED TOILETS *in a jiffy!*

Clear messy, stuffed toilets
Cut maintenance costs with

TOILAFLEX

Toilet ALL-ANGLE **Plunger**

Ordinary plungers don't seat properly. They permit compressed air and water to splash back. Thus you not only have a mess, but you lose the very pressure you need to clear the obstruction.

With "TOILAFLEX", expressly designed for toilets, no air or water can escape. The full pressure plows through the clogging mass and swishes it down. Can't miss!

Get a "TOILAFLEX" for your home too. Positive insurance against stuffed toilet.

- Double-size cup, double-pressure
- Tapered tail gives air-tight fit
- Designed to flex at any angle
- Centers itself, can't skid around

$2.65 Fully Guaranteed

Order from your Supplier of Hardware or Janitor Supplies

THE STEVENS-BURT CO., NEW BRUNSWICK, N. J.
A Division of The Water Master Company

circle 632 on Reader Service Card

For all-'round deodorizing

ROUNDS

Fragrant, laborless deodorant discs for urinals, bowls, garbage pails, lockers, closets

Deodoroma ROUNDS cost in use averages only a *fraction* of one cent a day. Rounds are formed under 70,000 pounds pressure: are dense and durable. Fragrance is locked in: lasts until the last particle has vaporized — there's no harsh "moth cake odor." Packed eight to the telescoping box — each Round sealed airtight — easy-to-shape Holzit wire holder in every box. For literature write to The C. B. Dolge Company, Westport, Conn.

For free sanitary survey of your premises ask your Dolge service man

expendable DOLGE
WESTPORT, CONNECTICUT

circle 633 on Reader Service Card

2 Time-Saving Sanders

NEW MODEL "DA"

Unusual "Dual-Action" air sander eliminates heat . . . retards loading of paper . . . is fast and economical. Excellent for sanding prime coat. Let us send you a complete description of this unusual new industrial sander. Write for our new catalog today.

FAMOUS MITY-MIDGET

This original orbital action air sander is lightweight, powerful in operation, and produces unusually fine finishes. Thousands are in use in factories throughout the world, where reliable, high-speed block sanders are needed. Write for our catalog describing the complete National-Detroit line today.

MODEL 400

ORIGINAL ORBITAL ACTION

NATIONAL-DETROIT, INC. ROCKFORD ILLINOIS

For more facts circle 634 on Reader Service Card

ACME VISIBLE

VISUAL CONTROL PANELS

Chart Action, Indicate Trends, Permit Comparison, Organize Facts

Complete flexibility with limitless signalling and charting possibilities . . . Easily adapted to your individual record requirements.

Lightweight panels contain clear plastic tubes which are individually removable and may be shifted from one position to another . . . Clarity of tube provides full legibility of contents.

ACME VISIBLE RECORDS, INC., Crozet, Virginia
☐ Send us more information on Visual Control Panels.
☐ We are interested in Acme Visible equipment for _____ records.
Kind of record FM-958
Company _____
Attention _____
Address _____
City _____ Zone ____ State ____

ADVERTISERS' LITERATURE

Begins on page 250

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

395—Magnets. Six-page folder with full descriptive data, charts, graphs, ordering method. Eriez Mfg. Co.

396—Wire Cloth. Catalog (94 pages) and stock list give full range available. Cambridge Wire Cloth Co.

397—Graphic Instruments. Bulletins 236A and 856 contain detailed information. Esterline-Angus Co.

398—Marking Devices. Free on request—handy ink guide, checklist, and catalog. Speedry Products, Inc.

399—Industrial TV. Illustrated brochure describes complete ITV equipment and systems. Philco Corp.

400—Graphic Instruments. Literature describes mechanical features and applications. D. C. McGiehan.

401—Steam Cleaners. Information on "How Industry Gets More Productive Hours." Homestead Valve Mfg. Co.

402—Shipping Labels. Free booklet, "How to Custom-Print Labels As You Need Them." Weber Marking Systems.

403—Screwdrivers. New catalog on insert bit and bit-holder combination tools. Apex Machine & Tool Co.

404—Finishing Systems. Catalog A-658 gives full information, tells about varied installations. R. C. Mahon Co.

405—Rapid Borer. Bulletin LC501H describes features of new high-speed borer. R. K. Le Blond Machine Tool Co.

406—Marking Devices. Complete data on supreme holder with new Roto-Pin lock feature. Pannier Corp.

407—Arc Welding. Bulletin 5301.1 shows how to speed up operations and cut costs. Lincoln Electric Co.

408—Shaft Mounted Drives. Bulletin 7100 describes mechanical features, suggests applications. The Falk Corp.

409—Hot Spray Painting. Free booklet "New Efficiency From Hot Spray," available on request. DeVilbiss Co.

410—Elastomeric Sealants. New manual gives complete story on polysulphide type. Thiokol Chemical Corp.

411—Cleaning Solvent. Booklet available on chlorothene solvent for cold-cleaning jobs. The Dow Chemical Co.

Turn the page

materials-handling news

NEW AND UNUSUAL APPLICATIONS OF BASSICK CASTERS THAT MIGHT BE ADAPTED TO YOUR HANDLING PROBLEMS

Idlewild Airport *economizes* with Bassick Floating Hub Casters

Here at the International Arrival Building, at New York International Airport, baggage moves quickly and easily on carts with Bassick Floating Hub Casters.

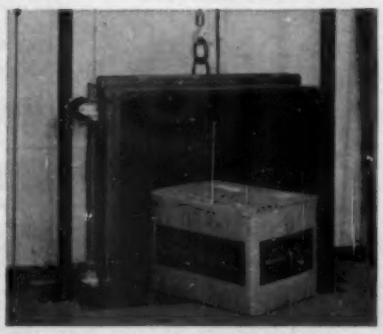
Why use Bassick Floating Hub casters here? Because actually, in the long run, they're less expensive, more economical than ordinary casters. Floating Hub construction cushions shocks, snubs out vibration which could harm baggage, floors or casters. As a result floors and casters last longer, and loads move faster and baggage isn't jiggled off carts.

These same principles of protecting floors, loads, and casters and of permitting higher speeds apply in any business, or industrial plant usage. Bassick Floating Hub Casters can save you money—not merely in handling fragile products—but on many general duty caster jobs as well. Test out a set of four on the job in your plant and see for yourself.

REVOLVING STAGE for the show, Plain and Fancy, rides casters at Bridgeport, Conn. That city's amateur Polka Dot Players have ingeniously constructed a 3½-ton revolving stage. It moves on 12 Bassick 6" Series H99 Grooved Wheel Casters operating on a 25-foot circular track.

B-42

ERECTO PALLET TURNTABLE turns on six inverted heavy duty Bassick Casters. Placed at end of conveyor line, it lets operator load up one side as lift truck removes palletized loads from the other. Made by Lamson Corporation, Syracuse, N. Y., here's another quality product using Bassick Casters.



CASTERS GUIDE DUMBWAITER at Rochester Stationery Company, Rochester, N. Y. Bassick Grooved Wheel Casters operating on angle iron guides hold this home-made elevator steady as it runs between basement and first floor. Can you use this ingenious material handling idea?

The man in your town to help keep costs down

He's your local distributor who handles Bassick Casters. He can help you hold handling costs to a minimum with time-and-money-saving, longer-lasting, easier-working casters. Get to know him better.

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THE BASSICK COMPANY

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A COMPLETE LINE OF
LIVE ROLLER CONVEYERS
engineered and standardized by

MATHEWS

A belt-driven Live Roller Conveyer with remotely-controlled air-operated deflectors is the heart of this modern shipping room dispatch system.

Mathews belt-driven Live Roller Conveyers are widely applied in modern package-handling systems. Packages deflect well from live roller lines, and they can be located at any reasonable level between the floor and ceiling.

Live Roller Conveyers can be reversible, and add greatly to the flexibility of the conveyer systems of which they are a part.

Write for Bulletin G.P.53 and Catalog 856 today.

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MATHEWS
Over Fifty Years of Leadership in Mechanized Handling

ADVERTISERS' LITERATURE

Begins on page 250

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

412—Fluid Drives. Technical bulletin describes mechanical details and applications. Dodge Mfg. Corp.

MISCELLANEOUS

413—Hydraulic Cylinders. Catalog SM-56-2 provides full engineering details. Tomkins-Johnson Co.

414—Coagulant Aids. Bulletin 410-12-2 gives detailed information on complete line. Calgon Co.

415—Personal Improvement. "Forging Ahead In Business" (48 pages)—free for asking. Alexander Hamilton Institute.

416—Tabulating Punch. Describes automatic punch-card processing with one low-cost machine. Royal McBee Corp.

417—Goggles. Illustrated specification folder (A-1684) shows new cup goggle line. Bausch & Lomb Optical Co.

Maintenance Reprints

Listed below are selected FACTORY reprints on Maintenance. They're rich with ideas for cutting costs. They're convenient for your file, your next conference, or for distribution to your plant operating executives or supervisors. To order, write to Readers' Service Dept., FACTORY, 330 W. 42nd St., New York 36.

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A147 How to Trim Painting Costs 35%
A148 18 Checks on Maintenance Costs
A151 Slashing Roof Repair Costs 30%
A157 4 Steps to Tool Maintenance
A158 16 Soft Spots to Hit in Maintenance Costs
A159 How to Make a Maintenance Audit

50 CENTS EACH

A24 Keep Your Plant Up—Costs Down
A25 Build a Maintenance Program Now
A26 Maintenance Control That Really Controls
A27 Boost the Maintenance Department's Productivity
A28 What Should Maintenance Cost?
A29 How to Find and Control Your Maintenance Costs
A30 Maintenance Work Measurement
A31 Best in Plant Maintenance (8 FACTORY Articles)
A32 Air Pollution—Big Problem
A33 Select the Right Floors
A34 Install Floors for Long Life
A35 Make Floors Last Longer
A106 Preventive Maintenance

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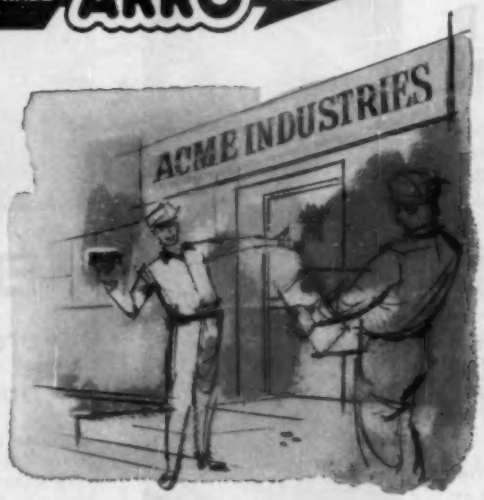
Always Specify TRADE ARRO MARK

Economy and service are two of the many advantages gained by purchasing Arro fastening and drilling devices, as needed, from your local industrial supplier, wholesale hardware or electrical supply house.



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See your industrial, hardware or electrical supplier TRADE ARRO MARK

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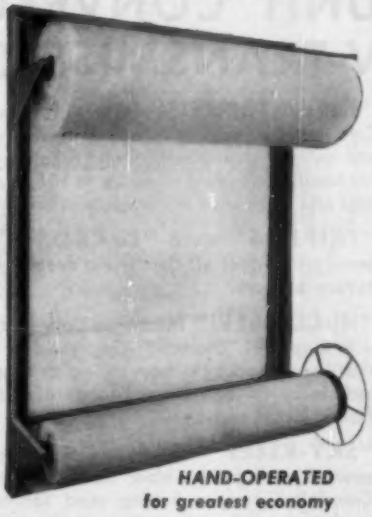

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NEW CONOMANUAL
gives the convenience of a roll-away, dry-type filter at low, low cost.

CONOMANUAL requires the VERY MINIMUM OF ATTENTION. A turn of the hand-wheel advances fresh media when needed. The loaded synthetic media is wound, dirty-side-in on its disposable core—easily removed without dirt, grease, or "shedding" problems.

To get complete information on the new CONOMANUAL mail coupon below for Bulletin #850 to

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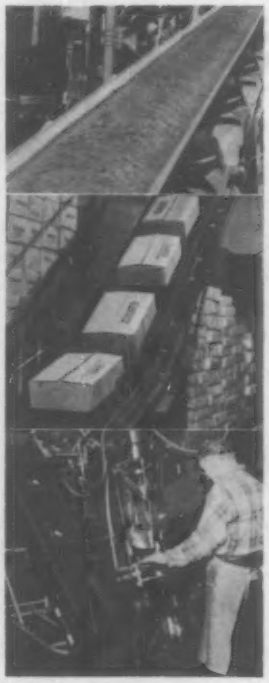
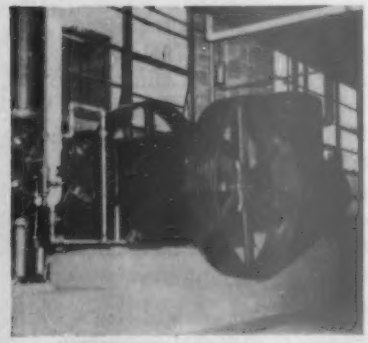


"SUPER TRIPLE-S". Goodall's finest Bulk Conveyor Belting . . . with a long-established record for outstanding quality and reliability. Used for handling crushed stone up to 10", ores, slag and other abrasive materials, wet or dry.

"TRIPLE-S" and "La CROSSE". Will serve with equal efficiency and economy in less severe services.

"HI-CLIMBER"® The Incline Conveyor Belting with a special "Diamond"-Grip molded surface that keeps packages from sliding or slipping on inclines up to 30°. Other brands available for flat or incline conveyors.

"SKY-KLEET"® The name that identifies specially-designed rubber cleats available on Goodall Conveyor Belting used for handling packages, small parts, stampings, minerals, chemicals, etc., on fixed or portable conveyors. Cleats are integrally molded to the belt, and spaced at any required distance.



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Built with larger, stronger, endless twin grommets to transmit greater H.P. This means fewer belts per drive, reduction in over-all weight, and less space required for any given load. The only high-capacity belts with so little stretch that the efficiency of the drive is not affected.

Greater flexibility gives "Power King" V-Belts one-third more gripping power than other types . . . they pull heavier loads.

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Suppose that every time you added plant facility—or built anew—you engineered the equipment from scratch. Impossible! Yet how often the plant itself is so engineered. Today, that is rarely necessary. And there are far more profitable uses for capital and engineering time.

That's why so many corporations have standardized on Butler pre-engineered metal buildings. Butler Buildings are designed for full support of the internal functions, and a better working climate—better light, better ventilation, better use of space. Components are precision mass produced. Construction is an assembly job, so fast it gets you in business weeks to months sooner. When it's time to expand, no other building can be enlarged so quickly and inexpensively.

Cost? Not the cheapest way to get shelter—but the lowest cost way to build well. Ask your nearest Butler Builder for the full story. He's listed in the Yellow Pages under "Buildings" or "Steel Buildings". Or write direct.

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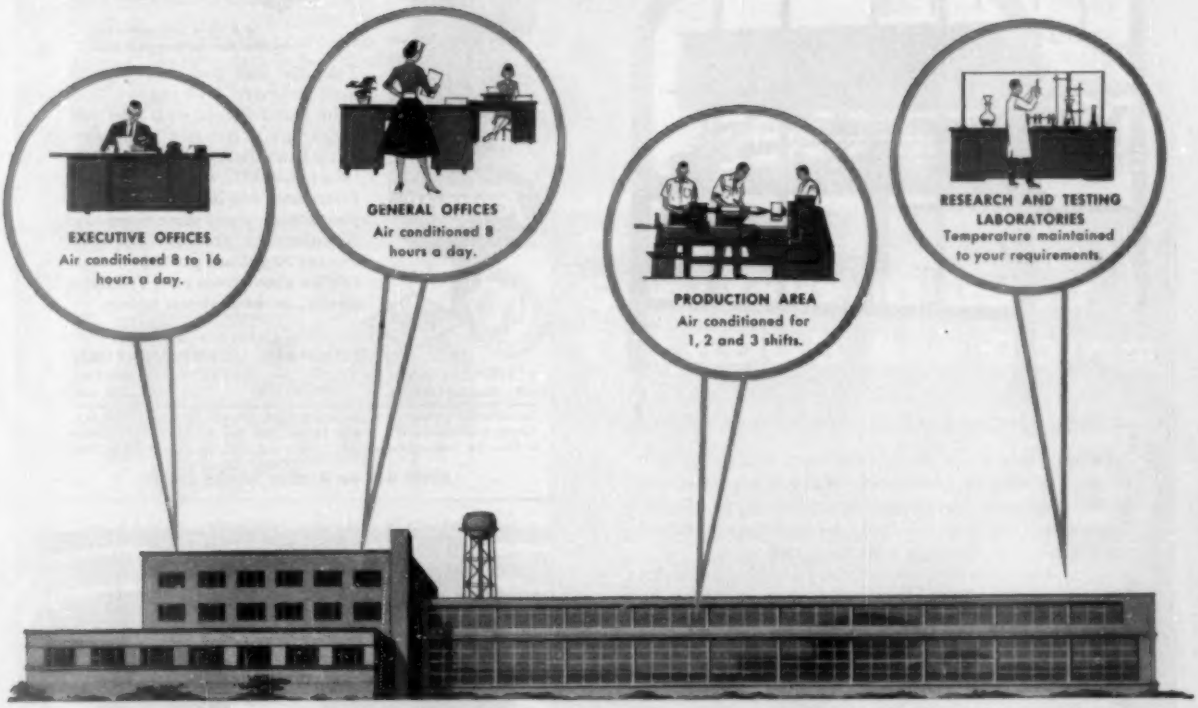
ZONE·BY·ZONE Air Conditioning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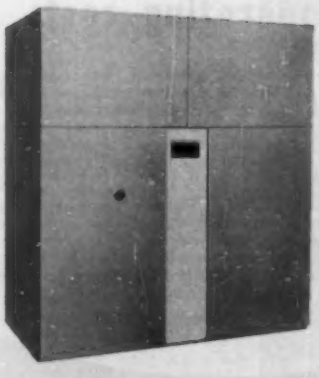

Air- and Water-Cooled Units — up to 30 tons water-cooled, 20 tons air-cooled. Note smooth lines — no outside fan motors, filters, controls or other protruding parts. Take only 77" x 43" of floor space.

Large organizations everywhere are recognizing the advantages of General Electric's Zone-by-Zone method of air conditioning. Installation without major alterations or work stoppage. Individual control of each unit—shutdown of one in no way disturbs the others. You cool only the zones you want, when you want, to the degree you want. Space is no problem—floor-mounted units may be stationed in or away from area served—ceiling-mounted units take no floor space. Install units step-by-step as your budget permits—flexible long term financing available on large installations.

Installation after installation has proved that large projects can be air conditioned more efficiently, at less cost, using General Electric Factory-Assembled Central Station Units for Zone-by-Zone installation. Planning is simplified—need for elaborate equipment rooms eliminated—and you have a choice of air- or water-cooled equipment. For full details have your architect or consulting engineer contact your General Electric Contractor. For free booklet on G-E Zone-by-Zone air conditioning write to: General Electric Co., Air Conditioning Department, Troup Highway, Tyler, Texas.

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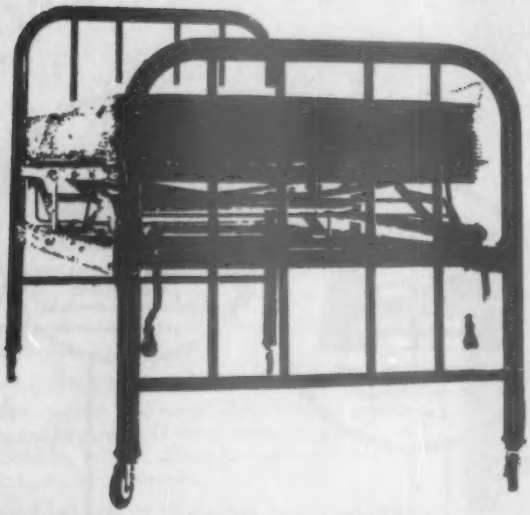
One accident that doesn't happen can pay for

ALCOA ABRASIVE TREAD PLATE



An employee slips on stairs, severely fractures his right heel. Disability is permanent. Medical expenses top $500. Employee compensation comes to $2,956.43. Production time is lost while a new employee is trained for the job. The employer's accident rate is up.

Such expensive and unnecessary slipping accidents kill or maim 20,000 workers in industry every year. To prevent such accidents, Alcoa® Aluminum Abrasive Tread Plate remains slip-proof even when wet, oily or greasy. Made of tough particles of fused aluminum oxide, its hard, abrasive surface is the only nonskid floor plate that gives you the advantages of lightweight, corrosion-resistant aluminum.

For more information on how you can eliminate hazardous conditions from floors, stairs, ramps and other areas, check the coupon below; write Aluminum Company of America, 1667-J Alcoa Building, or call your nearest Alcoa distributor.

MAKE YOUR OWN 30-second Safety Test . . . Check the Coupon for FREE Sample of Alcoa Aluminum Abrasive Tread Plate.

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No slips . . . no falls . . . no injuries with the safe, sure grip you get from Alcoa Abrasive Tread Plate.

ALUMINUM COMPANY OF AMERICA
Alcoa Building, Pittsburgh 19, Pa.

I'd like to see how Alcoa Abrasive Tread Plate prevents slipping. Please send me FREE sample—also application, design and fabricating data.

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low operating cost

Fuel cost is the total cost of operating Reznor gas unit heaters — and you pay only for the heat you actually need and use. Reznor heat is produced and distributed right at the point of need . . . eliminating transmission losses and costly stand-by firing of boilers. These completely automatic units don't require a licensed fireman . . . they don't require any operating labor at all.

LOW OPERATING COST is just one of many reasons why Reznor gas unit heaters are right for so many plant heating jobs. Whether you need one heater to eliminate a "trouble" spot or enough units for a complete plant heating system, ask your Reznor distributor for the complete story or write for your free copy of "Modern Heating."

Look for Reznor under Heaters Unit Htr. in the Yellow Pages

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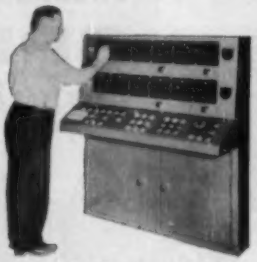
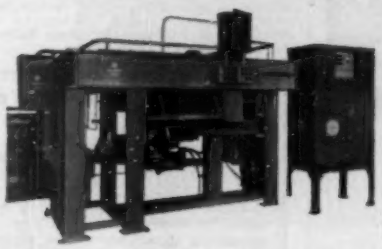
MULTI-SCAN FOR WEIGHING ITEMS IN MOTION

For items moving on overhead tracks (hog carcasses, for example) Toledo Multi-Scan system provides accurate average weights without necessity of bringing the swaying carcasses to rest. Weight data is fed into remotely located adding or other office machines for listing and totalizing of weights. Identifying data may also be introduced through key input stations.

AUTOMATIC BATCHING SYSTEMS



"Remocon" controls feature remote setting for fully automatic operation. Simple dial knob adjustments control quantities of each ingredient, allow precise duplication of batches. Extremely flexible — use with a single scale or multiple scale batching system.



PRODUCT TESTING AND CLASSIFYING

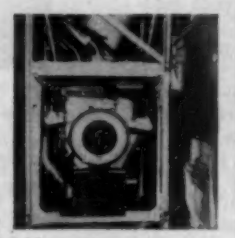
This custom-engineered Toledo automatically tests and classifies large coil springs. It is one of many types of Toledos used for classifying a wide range of items — from small packages to large cartons and production parts — in a variety of manufacturing operations.

Check These Specialized Jobs TOLEDOS Are Doing

When you have a problem in weighing, testing, counting, batching, sorting or weight data processing . . . and you want the practical, economical answer . . . it will pay you to check with Toledo. Toledo's complete line of industrial scales provides today's effective answer for a wide range of needs; or for special applications, Toledo Scale engineers will work with you on modifications or completely custom-engineered units. Toledo's huge reservoir of experience is your assurance of a practical, cost-saving solution. Let us help you. Write TOLEDO SCALE, Division of Toledo Scale Corporation, Toledo 12, Ohio.

TOLEDO HEADQUARTERS FOR WEIGHING SYSTEMS

AUTOMATIC BULK WEIGHING



Toledos provide accurate, net weight listing and totals of bulk materials going into truck or carload shipments. Weighing is automatic. A Toledo weight-control console with automatic recording and totalizing unit may be remotely located for operating convenience.

ELECTRONIC AND HYDRONIC SCALES

Toledo Electronic Scale heads may be remotely located wherever convenient, because there are no mechanical connections. Toledo offers full electronic scales, also combinations with hydraulic or mechanical components to meet a wide range of requirements. For specific applications, digital indication of parts counts may be provided electronically.

production

Sweet 1 Music at Columbia Records Plant...

Thanks to a

SPENCER

PNEUMATIC CONVEYING SYSTEM

Vacuum producer pulls pellets into separators (at right).

Production line of record presses fed by Spencer system.

From plastic pellets to completed discs, there is no manual handling of materials here at the Columbia Records plant, Bridgeport, Conn.

Pellets are picked up at the pelletizer, conveyed to a large hopper. From there, material is blown through a piped circuit to small "feed" hoppers on each automatic record pressing machine.

Advantages of the Spencer system are many and measurable:

Savings on Material Handling Costs—Manual and mechanical hopper-loading is eliminated, man-power freed for productive tasks.

Increased Production—No "down time" on record presses due to lack of material.

No Contamination of Material—Dirt, metal chips, glass, etc. cannot enter the piped system.

For recommendations (and suggested piping lay-out) on a SPENCER system to solve your needs, write outlining your requirements.

Request Bulletin No. 143-B

The SPENCER TURBINE COMPANY
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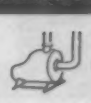
PORTABLE VACUUM CLEANERS



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Modern Tool of Industry

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This practical manual gives you proved ways to insure reliable cost estimates of machine - tool operations. Shows how to break down a machining job into separate factors, how to accurately figure the costs of each. In addition there is essential information on cutting tools, materials handling, motion economy, and mechanical equipment. **By C. W. S. Parsons, Cal. State Polytechnic College. 366 pp., 112 illus., $8.00**

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Seventy-five experts give you practical, workable answers to hundreds of problems relating to **every function** of maintenance engineering. From the organization and administration of maintenance forces to sanitation, welding, and corrosion control, here are the maintenance procedures that produce results. **Ed. by L. C. Morrow, Chairm., Nat'l Plant Maint. & Engrg. Confs. 1536 pp., 728 illus., $20.00**

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FAC-9

How'd you like to help us pick the "TOP 10 PLANTS OF 1959"?

My name's Oswald Stewart. I'm Buildings and Facilities Editor of FACTORY Management and Maintenance. I need your help.

Every year—for 25 years—FACTORY's editors have toiled to select the "Top 10 Plants" in all America. We're not tired. But it's a big job.

No matter how painstakingly we track down candidates for these awards, frankly we're afraid of missing even a single one of real merit. And that's where you come in . . .

Perhaps you're working in a new plant right this minute—one that you're mighty proud of. Good! Use the nominating coupon below and tip us off. Or maybe your company broke ground recently—or has a fine, new branch plant. Grab that coupon!

You get around. Does any new plant you've visited lately look exciting? How about one of your customers? What better way to win his undying goodwill? Tell us about it on the coupon, won't you?

That's about all there is to it. We'll do the rest—take care of all the details. We'll follow up the proper people, provide them with the necessary questionnaires, etc.

What plants are eligible? Those that are completed and put into production between January 1 and December 31, 1958.

Think of the thrill you'll get next year, when you open up the May issue of FACTORY . . . and there among the "Top 10 Plants of 1959" is the one that you were the very first to nominate!

To: OSWALD STEWART, Buildings & Facilities Editor
FACTORY Management and Maintenance
330 West 42nd St., New York 36

I nominate the below-named new plant for one of FACTORY'S Top 10 Plant Awards:

Plant name .....

Plant address .....

For more data, write to .....

.....

My name and address .....

.....

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rust preventives protect u.s. army tanks in storage...

The following Valvoline Tectyl Rust Preventives are regularly used by the **Chrysler Corporation Delaware Defense Plant, at Newark, Delaware.**

TECTYL 894 — Protects critical bare steel or phosphated surfaces for extended periods while in storage . . . also protects interior surfaces of machinery, instruments or material under cover. For use where water or a saline solution must be displaced from corrodible surfaces.

TECTYL 858 — An automotive and artillery corrosion — resistant grease. For use under all conditions of service where ambient temperatures range from minus 65 degrees F. to plus 125 degrees F.

TECTYL RUST PREVENTIVES are petroleum-based coatings with chemical additives. Easy to apply and remove . . . will spread evenly . . . can be brushed, dipped or sprayed.

There are many highly specialized TECTYL formulas. Write TODAY for information and advice without obligation. Describe metal and types of exposure. Dept. FMM-958

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Division of ASHLAND OIL & REFINING COMPANY

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U. S. Army tanks just completed at the Delaware Chrysler plant, shown on way to storage yard and a TECTYL rust preventive coating.

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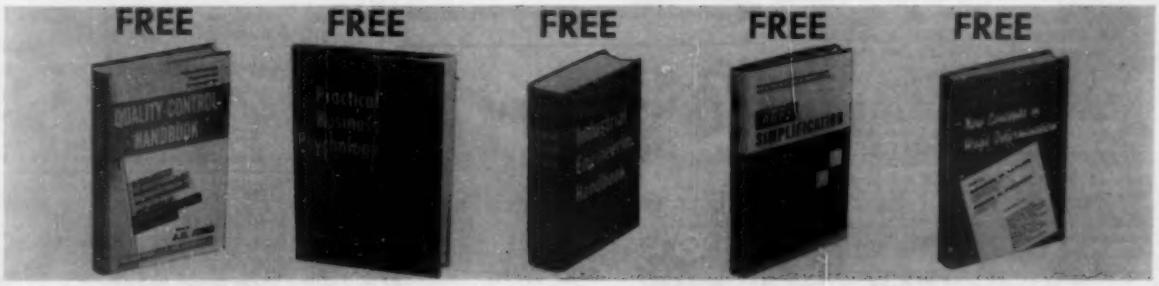

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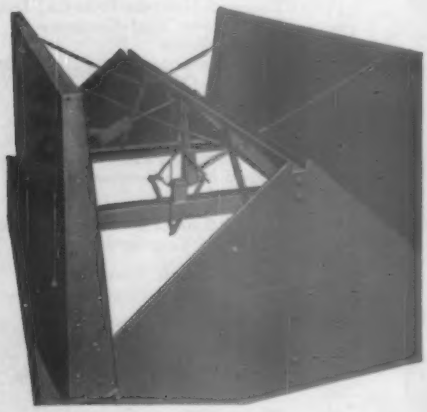

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Catalogs In This Issue

To help you, here is a list of catalogs described in this issue. To obtain, circle key numbers on either postcard.

MATERIALS HANDLING
1—Lift Trucks
2—Slings and Fittings
3—Tube-Veyor
4—Palletainers
5—Sling Chains
6—Fork Lift Trucks
7—Materials Handling Equipment
8—Hoists
9—Load Handling Equipment
10—Tractor Shovel
11—Speed Trucks
12—Belt Idler
13—Lift Truck Attachments

BUILDING AND EQUIPMENT
14—Fiberglas Insulations
15—Expansion Joints
16—Precast Concrete Floor, Roof
17—Roofing, Skylights, Doors
18—Duct Joint Seals
19—Fire Protection Equipment

MATERIALS
20—Tapes, Refinishers, Adhesives
21—Balsa Core Panels
22—Polyethylene
23—Refractory Brick
24—Plastic Steel

PRODUCTION
25—Vertical Profiler, Positioner
26—Woodworking Machines
27—Torch
28—Vacuum Processing
29—Dryer Blender
30—Multiple Rotary Slitting Lines
31—Precision Tools, Machining

VALVES, PIPES AND FITTINGS
32—Couplings
33—Corrosion Resistant Valves
34—Automatic Valves
35—Butterfly Valves
36—Hydraulic Tube Fittings
37—Valves

HEATING AND AIR CONDITIONING
38—Air Conditioning Units
39—Steam, Hot Water Heaters
40—Air Handling
41—Heaters, Air Conditioners

MAINTENANCE
42—Metal Cutting Band Saws
43—Scrubbers, Polishers
44—Rolling Scaffold Towers
45—Pipe Rotator
46—Conduit Bending
47—Wire Rope Splicing
48—Magnesium Anodes

MECHANICAL
49—Speed Reducers
50—Flexible Drive Couplings
51—Speed Control Systems

INSTRUMENTS AND CONTROLS
52—Recording Annunciators
53—Crane Scale
54—Flowmeters
55—Volt-Ammeter-Ohmmeter
56—Liquid Level Control

AUXILIARY
57—Steam Generator
58—Pumps
59—Cycloidal Blowers
60—Steam Generators

ELECTRICAL
61—Transformers
62—Wire, Cable Insulation
63—Raceways, Fittings, Lighting
64—Silicone Insulating Components
65—Miniature Connectors
66—RLM Standards
67—Pancake Motors

MISCELLANEOUS
68—Calculagraph
69—Stainless Steel Wire
70—Fire Alarm, Phone Systems
71—Isolites
72—Odor Control
73—Box Sealer, Applicators, Bundler

ASK THE MEN IN THE PLANT!

They'll Tell You the Thing They Want Most in a Safety Switch is **SAFETY THEY CAN SEE**

—and that means

VISIBLE BLADES

The men who pull the switches will tell you what can happen when a switch, *believed* to be open—*isn't.* A lot of things can happen—and every one of them is bad. Personnel is in danger. Motors can single-phase. Machinery and work can be damaged. Down-time can skyrocket.

Doesn't it make sense to insist on **V**isible Blade construction which gives you a road block against any of those possibilities? Doesn't it make equally good sense to insist on the safety switch which gives you that construction—plus a lot of other performance advantages?

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

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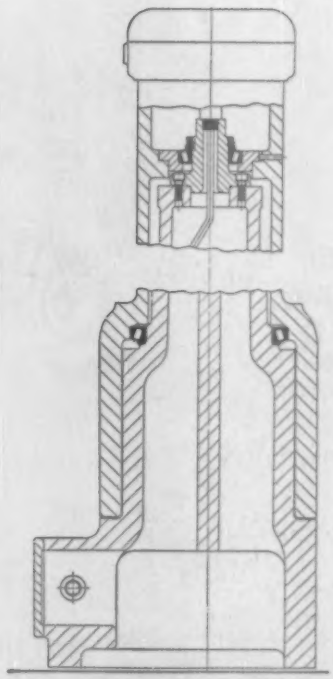
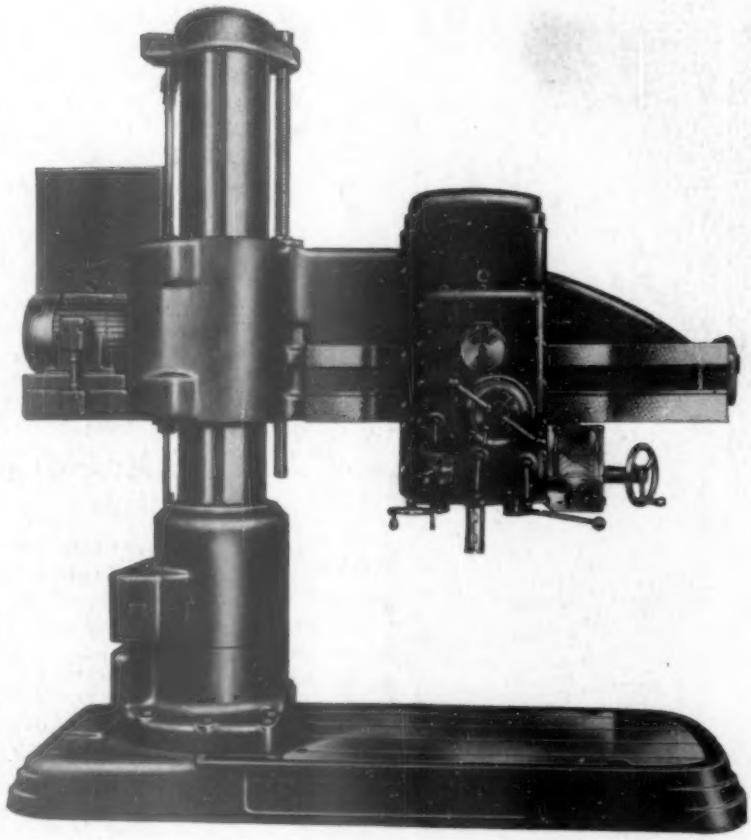


How **THE AMERICAN TOOL WORKS CO.** mounts column of 32-speed Hole Wizard Radial on 2 Timken bearings to increase rigidity 50%. Spindle and transmission use 11 more Timken bearings.



This radial drill has 50% more rigidity with column mounted on Timken® bearings

TO resist stresses and cut arm deflection in half, the column unit of this 32-speed Hole Wizard Radial is mounted on two Timken® tapered roller bearings. With a large, preloaded Timken bearing at top and bottom, The American Tool Works Company gives the column and sleeve the rigidity of a single piece. This results in greater accuracy and longer cutting tool life, permits higher speeds and coarser feeds.

HOW COLUMN IS HELD RIGID. Timken bearings keep the column unit in positive alignment. Their tapered design lets them take both thrust and radial loads in any combination. And full line contact between rollers and races gives Timken bearings load-carrying capacity to spare.

HEAVY SHOCKS ABSORBED. Rollers and races of Timken bearings are case-carburized to give them hard, wear-resistant surfaces over tough, shock-resistant cores. They reduce maintenance.

FRICTION VIRTUALLY ELIMINATED. Timken bearings run smoother, last longer, because they're geometrically designed for true rolling motion—and precision-made to live up to their design. We even make our own electric furnace, fine alloy steel—the only American bearing maker who does.

So whether you buy or build machines, it pays to specify bearings trademarked "TIMKEN". The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS ROLL THE LOAD

For more facts circle 448 on READER SERVICE CARD